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(56) Related Art
FANG, A. ET AL: "Production of Clostridium difficile toxin in a medium totally free of both animal and dairy proteins or digests", PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES,vol. 106, no. 32, 11 August 2009, pages 13225-13229
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— *as to the identity of the inventor (Rule 4.17(i))*

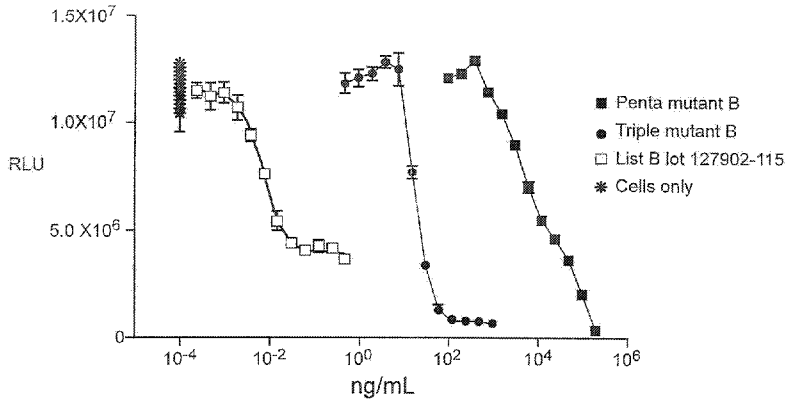
— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

— *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

[Continued on next page]

(54) **Title**: COMPOSITIONS AND METHODS RELATING TO A MUTANT CLOSTRIDIUM DIFFICILE TOXIN

FIG. 26



(57) **Abstract**: In one aspect, the invention relates to an immunogenic composition that includes a mutant *Clostridium difficile* toxin A and/or a mutant *Clostridium difficile* toxin B. The mutant toxin may include a glucosyltransferase domain having at least one mutation and a cysteine protease domain having at least one mutation, relative to the corresponding wild-type *C. difficile* toxin. The mutant toxins may include at least one amino acid that is chemically crosslinked. In another aspect, the invention relates to methods and compositions for use in culturing Clostridium difficile and in producing *C. difficile* toxins.

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COMPOSITIONS AND METHODS RELATING TO A MUTANT *CLOSTRIDIUM DIFFICILE* TOXIN

CROSS REFERENCE TO RELATED APPLICATIONS

The present application claims the benefit of U.S. Provisional Patent Application 61/716,605, filed on October 21, 2012, which is incorporated by reference in its entirety.

FIELD

The present invention is directed to compositions and methods relating to mutant *Clostridium difficile* toxins.

BACKGROUND

Clostridium difficile (*C. difficile)* is a Gram-positive anaerobic bacterium that is associated with gastrointestinal disease in humans. Colonization of *C. difficile* usually occurs in the colon if the natural gut flora is diminished by treatment with antibiotics. An infection can lead to antibiotic-associated diarrhea and sometimes pseudomembranous colitis through the secretion of the glucosylating toxins, toxin A and toxin B (308 and 270 kDa, respectively), which are the primary virulence factors of *C. difficile*.

Toxin A and toxin B are encoded within the 19 kb pathogenicity locus (PaLoc) by the genes *tcdA* and *tcdB*, respectively. Nonpathogenic strains of *C. difficile* have this locus replaced by an alternative 115 base pair sequence.

Both toxin A and toxin B are potent cytotoxins. These proteins are homologous glucosyltransferases that inactivate small GTPases of the Rho/Rac/Ras family. The resulting disruption in signaling causes a loss of cell–cell junctions, dysregulation of the actin cytoskeleton, and/or apoptosis, resulting in the profound secretory diarrhea that is associated with *Clostridium difficile* infections (CDI).

In the last decade, the numbers and severity of *C. difficile* outbreaks in hospitals, nursing homes, and other long-term care facilities increased dramatically. Key factors in this escalation include emergence of hypervirulent pathogenic strains, increased use of antibiotics, improved detection methods, and increased exposure to airborne spores in health care facilities.

Metronidazole and vancomycin represent the currently accepted standard of care for the antibiotic treatment of *C. difficile* associated disease (CDAD). However, about 20% of patients receiving such treatment experience a recurrence of infection after a first episode of CDI, and up to about 50% of those patients suffer from additional

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recurrences. Treatment of recurrences represents a very significant challenge, and the majority of recurrences usually occur within one month of the preceding episode.

Accordingly, there is a need for immunogenic and/or therapeutic compositions and methods thereof directed to *C. difficile*.

SUMMARY OF THE INVENTION

In a first aspect there is provided a culture medium comprising soy hydrolysate, yeast extract, and glucose, wherein the medium comprises a *Clostridium difficile* bacterium which comprises the amino acid sequence set forth in any one of SEQ ID NOs: 178-761.

In a second aspect there is provided a method of culturing *Clostridium difficile* comprising culturing *C. difficile* in a medium, wherein the medium comprises soy hydrolysate, yeast extract, and glucose, and wherein the medium comprises a *Clostridium difficile* bacterium derived from VPI 11186, wherein the bacterium lacks an endogenous polynucleotide encoding a toxin, wherein the bacterium comprises a polynucleotide encoding a mutant *C. difficile* toxin, wherein the bacterium further comprises a Clostridium sporogenes feredoxin (fdx) promoter.

In a third aspect there is provided a method of producing a *Clostridium difficile* toxin comprising culturing *C. difficile* in a medium under suitable conditions to produce a toxin, and isolating the toxin from the medium; wherein the medium comprises soy hydrolysate, yeast extract, and glucose, and wherein the medium comprises a *Clostridium difficile* bacterium derived from VPI 11186, wherein the bacterium lacks an endogenous polynucleotide encoding a toxin, wherein the bacterium comprises a polynucleotide encoding the mutant *C. difficile* toxin, wherein the bacterium further comprises a Clostridium sporogenes feredoxin (fdx) promoter.

In a fourth aspect there is provided a method of producing a mutant *Clostridium difficile* toxin comprising culturing *C. difficile* in a medium under suitable conditions to produce the toxin, and isolating the toxin from the medium; wherein the medium comprises soy hydrolysate and glucose, wherein the medium comprises a *Clostridium difficile* bacterium.

It is to be noted that, throughout the description and claims of this specification, the word 'comprise' and variations of the word, such as 'comprising' and 'comprises', is not intended to exclude other variants or additional components, integers or steps.

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Modifications and improvements to the invention will be readily apparent to those skilled in the art. Such modifications and improvements are intended to be within the scope of this invention.

Any reference to or discussion of any document, act or item of knowledge in this specification is included solely for the purpose of providing a context for the present invention. It is not suggested or represented that any of these matters or any combination thereof formed at the priority date part of the common general knowledge, or was known to be relevant to an attempt to solve any problem with which this specification is concerned.

In another aspect, the invention relates to a mutant *C. difficile* toxin A. The mutant toxin A includes a mutation at residues positions 285, 287, 700, 972, and 978 as compared to a wild-type toxin A. In one embodiment, the mutant toxin A includes SEQ ID NO: 183. In one embodiment, the mutant toxin A is less cytotoxic than a corresponding wild-type toxin A. In one embodiment, the mutant toxin A includes at least one amino acid residue that is chemically modified. In one aspect, the invention relates to an isolated polypeptide that includes SEQ ID NO: 183.

In another aspect, the invention relates to a mutant *C. difficile* toxin B. The mutant toxin B includes a mutation at residues 286, 288, 698, 970, and 976 as compared to a wild-type toxin B. In one embodiment, the mutant toxin B includes SEQ ID NO: 184. In one embodiment, the mutant toxin B is less cytotoxic than a corresponding wild-type toxin B. In one embodiment, the mutant toxin A includes at least one amino acid residue that is chemically modified. In one aspect, the invention relates to an isolated polypeptide that includes SEQ ID NO: 184.

The invention further relates to compositions and methods for use in culturing *C. difficile* and producing *C. difficile* toxins. In one aspect, the invention relates to a culture medium including a vegetable hydrolysate and a *C. difficile* cell. In a preferred embodiment, the hydrolysate is soy hydrolysate. More preferably, the soy hydrolysate is soy hydrolysate SE50MK.

In another aspect, the invention relates to a culture medium including a nitrogen source and a *C. difficile* cell. In one embodiment, the nitrogen source is a yeast extract. Preferably, the yeast extract is HY YEST 412 (Kerry Biosciences).

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In a further aspect, the invention relates to a culture medium including a vegetable hydrolysate, yeast extract, and a *C. difficile* cell. In one embodiment, the medium does not contain a carbon source.

In a preferred embodiment, the medium further includes a carbon source. The inventors discovered that fermentation of *C. difficile* in a culture medium including at

least one carbon source provided high OD_{600} values and high toxin production yields, as compared to fermentation without a carbon source. In one embodiment, the carbon source is glucose, mannitol, fructose, and/or mannose.

In one embodiment, the *C. difficile* cell is not genetically modified. In another embodiment, the *C. difficile* cell is a recombinant *C. difficile* cell. In one embodiment, the *C. difficile* cell is lacks an endogenous polynucleotide encoding a toxin. In another embodiment, the cell includes a constitutive promoter. In a preferred embodiment, the promoter is a *Clostridium sporogenes* feredoxin (*fdx*) promoter. In a further embodiment, the cell does not include a native, regulated chromosomal promoter.

In another aspect, the invention relates to a method of culturing *C. difficile*. The method includes culturing a *C. difficile* cell in a medium. In one embodiment, the medium includes soy hydrolysate and/or yeast extract. In a preferred embodiment, the medium further includes a carbon source. Preferably, the carbon source is glucose.

In one embodiment, the culturing step is carried out under anaerobic conditions.

In one embodiment, the *C. difficile* is grown as a seed culture. In one embodiment, the seed culture is started by inoculation from a stock culture that was grown in the medium.

In one embodiment, the *C. difficile* is grown as a fermentation culture. In one embodiment, the fermentation culture was inoculated from a seed culture that was grown in the medium.In an alternative aspect, the invention relates to a method of culturing *C. difficile*. The method includes culturing a *C. difficile* cell in a monoclonal antibody medium.

In one aspect, the invention relates to a method of producing a *C. difficile* toxin. The method includes culturing a *C. difficile* cell in a medium. The method further includes isolating a *C. difficile* toxin from said medium.

BRIEF DESCRIPTION OF DRAWINGS

Figure 1 A-H: Sequence alignment of wild-type *C. difficile* toxin A from strains 630, VPI10463, R20291, CD196, and mutant toxin A having SEQ ID NO: 4, using CLUSTALW alignment, default parameters.

Figure 2 A-F: Sequence alignment of wild-type *C. difficile* toxin B from strains 630, VPI10463, R20291, CD196, and mutant toxin B having SEQ ID NO: 6, using CLUSTALW alignment, default parameters.

Figure 3: Graph showing identification of wild-type toxin-negative *C. difficile* strains. Culture media of 13 *C. difficile* strains were tested by ELISA for toxin A. As illustrated, seven strains expressed toxin A and 6 strains did not (strains 1351, 3232, 7322, 5036, 4811 and VPI 11186).

Figure 4 A and B: SDS-PAGE results illustrating that triple mutant A (SEQ ID NO: 4), double mutant B (SEQ ID NO: 5), and triple mutant B (SEQ ID NO: 6) do not glucosylate Rac1 or RhoA GTPases in an *in vitro* glucosylation assays with UDP-^{14}C-glucose; whereas 10 µg to 1 ng of wild type toxin B does glucosylate Rac1.

Figure 5: Western blot indicating abrogation of cysteine protease activity in mutant toxins A and B (SEQ ID NOs: 4 and 6, respectively), as compared to observation of cleaved fragments of wild-type toxins A and B (SEQ ID NOs: 1 and 2, respectively). See Example 13.

Figure 6: Graphs showing that triple mutant toxins A and B (SEQ ID NOs: 4 and 6, respectively) exhibit residual cytotoxicity when tested at high concentrations (e.g., about 100 µg/ml) by *in vitro* cytotoxicity assay in IMR-90 cells.

Figure 7: Graph showing that EC_{50} values are similar for the triple mutant toxin B (SEQ ID NO: 6) and hepta mutant toxin B (SEQ ID NO: 8).

Figure 8: Graph representing results from *in vitro* cytotoxicity tests in which the ATP levels (RLUs) are plotted against increasing concentrations of the triple mutant TcdA (SEQ ID NO: 4)(top panel) and triple mutant TcdB (SEQ ID NO: 6)(bottom panel). Residual cytotoxicity of mutant toxin A and B can be completely abrogated with neutralizing antibodies specific for mutant toxin A (top panel-pAb A and mAbs A3-25 + A60-22) and mutant toxin B (bottom panel-pAb B).

Figure 9: Images of IMR-90 cell morphology at 72 hours post treatment. Panel A shows mock treated control cells. Panel B shows cell morphology following treatment with formalin inactivated mutant TcdB (SEQ ID NO: 6). Panel C shows cell morphology

following treatment with EDC inactivated mutant TcdB (SEQ ID NO: 6). Panel D shows cell morphology following treatment with wild-type toxin B (SEQ ID NO: 2). Panel E shows cell morphology following treatment with triple mutant TcdB (SEQ ID NO: 6). Similar results were observed for TcdA treatments.

Figure 10: Graph showing neutralizing antibody titers as described in Example 25 (study muCdiff2010-06).

Figure 11A-B: Graph showing neutralizing antibody titers as described in Example 26 (study muCdiff2010-07).

Figure 12: Graph showing neutralizing antibody responses against toxins A and B in hamsters after four immunizations as described in Example 27 (study ham*C. difficile*2010-02)

Figure 13A-B: Graph showing neutralizing antibody responses in hamsters after vaccination with chemically inactivated genetic mutant toxins and List Biological toxoids, as described in Example 27 (study ham*C. difficile*2010-02).

Figure 14: Survival curves for three immunized groups of hamsters as compared to the non-immunized controls, described in Example 28 (study ham*C. difficile*2010-02, continued).

Figure 15: Graph showing relative neutralizing antibody response against different formulations of *C. difficile* mutant toxins in hamsters (study ham*C. difficile*2010-03), as described in Example 29.

Figure 16A-B: Graphs showing strong relative neutralizing antibody response against chemically inactivated genetic mutant toxins A and B (SEQ ID NOs: 4 and 6, respectively) in cynomolgus macaques, as described in Example 30.

Figure 17: Amino acid sequences of variable regions of light (VL) and heavy (HL) chains of A3-25 mAb IgE. Signal peptide – highlighted; CDRs – italicized and underlined; Constant region – bolded and underlined (complete sequence not shown).

Figure 18: Graph showing titration of individual toxin A monoclonal antibodies in the toxin neutralization assay using ATP levels (quantified by relative light units- RLU) as an indicator of cell viability. In comparison to the toxin ($4xEC_{50}$) control, mAbs A80-29, A65-33, A60-22 and A3-25 had increasing neutralizing effects on toxin A with concentration but not to the level of the positive rabbit anti-toxin A control. mAbs A50-10, A56-33, and A58-46 did not neutralize toxin A. The cell only control was 1 -1.5x10^6 RLUs.

Figure 19: Mapping of 8 epitope groups of toxin B mAbs by BiaCore

Figure 20A-C: Synergistic neutralizing activities of combinations of toxin A mAbs: Adding different dilutions of neutralizing antibodies A60-22, A65-33, and A80-29 to increasing concentrations of A3-25 mAb synergistically increased the neutralization of toxin A regardless of the dilution. The RLUs of the toxin A only (4x EC_{50}) control is illustrated (<0.3x10^6) and cell only controls were 2-2.5 x10^6 RLUs as depicted in graphs shown in Figure 20B and Figure 20C.

Figure 21: Synergistic neutralizing activities of toxin B mAbs: Neutralization of toxin B by mAbs 8-26, B60-2 and B59-3 is illustrated in Figure 21A. Neutralization of toxin B is synergistically increased after combining B8-26 with dilutions of B59-3 (Figure 21B)

Figure 22: Western blot showing that Rac1 GTPase expression is reduced in genetic mutant toxin B (SEQ ID NO: 6) extracts from 24 to 96 hours, but not in wild-type toxin B (SEQ ID NO: 2) treated extracts. The blot also shows that Rac1 is glucosylated in toxin B-treated extracts, but not in genetic mutant toxin B treated extracts.

Figure 23A-K: Graph representing results from *in vitro* cytotoxicity tests in which the ATP levels (RLUs) are plotted against increasing concentrations of *C. difficile* culture media and the hamster serum pool (■);crude toxin (culture harvest) from the respective strain and the hamster serum pool (●); purified toxin (commercial toxin obtained from List Biologicals) and the hamster serum pool (▲); crude toxin (▼), control; and purified toxin (◆), control. The toxins from the respective strains were added to the cells at 4xEC_{50} values. Figure 23 shows that an immunogenic composition including mutant TcdA (SEQ ID NO: 4) and mutant TcdB (SEQ ID NO: 6), wherein the mutant toxins were inactivated with EDC, according to, for example, Example 29, Table 15, described herein, induced neutralizing antibodies that exhibited neutralizing activity against toxins from at least the following 16 different CDC strains of *C. difficile*, in comparison to the respective toxin only control: 2007886 (Figure 23A); 2006017 (Figure 23B); 2007070 (Figure 23C); 2007302 (Figure 23D); 2007838 (Figure 23E); 2007886 (Figure 23F); 2009292 (Figure 23G); 2004013 (Figure 23H); 2009141 (Figure 23I); 2005022 (Figure 23J); 2006376 (Figure 23K).

Figure 24: Illustration of an exemplary EDC/NHS inactivation of mutant *C. difficile* toxins, resulting in at least three possible types of modifications: crosslinks, glycine adducts, and beta-alanine adducts. Panel A illustrates crosslinking. Carboxylic

residues of triple mutant toxins are activated by the addition of EDC and NHS. The activated esters react with primary amines to form stable amide bonds, resulting in intra- and intermolecular crosslinks. Panel B illustrates formation of glycine adducts. After inactivation, residual activated esters are quenched by the addition of glycine to form stable amide bonds. Panel C illustrates formation of beta-alanine adducts. Three moles of NHS can react with one mole of EDC to form activated beta-alanine. This then reacts with primary amines to form stable amide bonds.

Figure 25: Illustration of an exemplary EDC/NHS inactivation of mutant *C. difficile* toxins, resulting in at least one of the following types of modifications: (A) crosslinks, (B) glycine adducts, and (C) beta-alanine adducts.

Figure 26: Graph representing results from an *in vitro* cytotoxicity assay in which the ATP levels (RLUs) (72 hr ATP) are plotted against increasing concentrations of the wild-type TcdB, commercially obtained from List Biologicals (□), triple mutant TcdB(SEQ ID NO: 86)(●), and penta mutant TcdB (SEQ ID NO: 184) (■). IMR-90 cells (✷) were used as control.

Figure 27: Graph showing competitive inhibition of triple mutant toxin B (SEQ ID NO: 86)-mediated cytotoxicity by penta mutant toxin B (SEQ ID NO: 184) on IMR -90 cells, (72 hr ATP assay). –●– represents penta mutant toxin B (SEQ ID NO: 184)("PM-B"); –▲– represents triple mutant (TM) at 200 ng/mL.

Figure 28: Graph showing final OD and triple mutant toxin B titer (mg/l) following a perfusion fermentation (CDF-5126). –●– represents $OD_{600\ nm}$; –▲– represents perfusion flow rate (Fermentor volumes/2.0h); –■– representsglucose (g/L); – ●– represents toxoid B (triple mutant, SEQ ID NO: 86)

Figure 29: Graph showing final OD and triple mutant toxin B titer (mg/l) results from another perfusion culture (CDF-5127). –●– represents $OD_{600\ nm}$; –▲– represents perfusion flow rate (Fermentor volumes/2.0h); –■– representsglucose (g/L); – ●– represents toxoid B (triple mutant, SEQ ID NO: 86).

BRIEF DESCRIPTION OF SEQUENCES

SEQ ID NO: 1 sets forth the amino acid sequence for wild-type *C. difficile* 630 toxin A (TcdA).

SEQ ID NO: 2 sets forth the amino acid sequence for wild-type *C. difficile* 630 toxin B (TcdB).

SEQ ID NO: 3 sets forth the amino acid sequence for a mutant TcdA having a mutation at positions 285 and 287, as compared to SEQ ID NO: 1.

SEQ ID NO: 4 sets forth the amino acid sequence for a mutant TcdA having a mutation at positions 285, 287, and 700, as compared to SEQ ID NO: 1.

SEQ ID NO: 5 sets forth the amino acid sequence for a mutant TcdB having a mutation at positions 286 and 288, as compared to SEQ ID NO: 2.

SEQ ID NO: 6 sets forth the amino acid sequence for a mutant TcdB having a mutation at positions 286, 288, and 698, as compared to SEQ ID NO: 2.

SEQ ID NO: 7 sets forth the amino acid sequence for a mutant TcdA having a mutation at positions 269, 272, 285, 287, 460, 462, and 700, as compared to SEQ ID NO: 1

SEQ ID NO: 8 sets forth the amino acid sequence for a mutant TcdB having a mutation at positions 270, 273, 286, 288, 461, 463, and 698, as compared to SEQ ID NO: 2

SEQ ID NO: 9 sets forth a DNA sequence encoding a wild-type *C. difficile* 630 toxin A (TcdA).

SEQ ID NO: 10 sets forth a DNA sequence encoding a wild-type *C. difficile* 630 toxin B (TcdB).

SEQ ID NO: 11 sets forth a DNA sequence encoding SEQ ID NO: 3

SEQ ID NO: 12 sets forth a DNA sequence encoding SEQ ID NO: 4

SEQ ID NO: 13 sets forth a DNA sequence encoding SEQ ID NO: 5

SEQ ID NO: 14 sets forth a DNA sequence encoding SEQ ID NO: 6

SEQ ID NO: 15 sets forth the amino acid sequence for wild-type *C. difficile* R20291 TcdA.

SEQ ID NO: 16 sets forth a DNA sequence encoding SEQ ID NO: 15.

SEQ ID NO: 17 sets forth the amino acid sequence for wild-type *C. difficile* CD196 TcdA.

SEQ ID NO: 18 sets forth a DNA sequence encoding SEQ ID NO: 17.

SEQ ID NO: 19 sets forth the amino acid sequence for wild-type *C. difficile* VPI10463 TcdA.

SEQ ID NO: 20 sets forth a DNA sequence encoding SEQ ID NO: 19.

SEQ ID NO: 21 sets forth the amino acid sequence for wild-type *C. difficile* R20291 TcdB.

SEQ ID NO: 22 sets forth a DNA sequence encoding SEQ ID NO: 21.

SEQ ID NO: 23 sets forth the amino acid sequence for wild-type *C. difficile* CD196 TcdB.

SEQ ID NO: 24 sets forth a DNA sequence encoding SEQ ID NO: 23.

SEQ ID NO: 25 sets forth the amino acid sequence for wild-type *C. difficile* VPI10463 TcdB.

SEQ ID NO: 26 sets forth a DNA sequence encoding SEQ ID NO: 25.

SEQ ID NO: 27 sets forth a DNA sequence of a pathogenicity locus of wild-type *C. difficile* VPI10463.

SEQ ID NO: 28 sets forth the amino acid sequence for residues 101 to 293 of SEQ ID NO: 1.

SEQ ID NO: 29 sets forth the amino acid sequence for residues 1 to 542 of SEQ ID NO: 1.

SEQ ID NO: 30 sets forth the amino acid sequence for residues 101 to 293 of SEQ ID NO: 2.

SEQ ID NO: 31 sets forth the amino acid sequence for residues 1 to 543 of SEQ ID NO: 2.

SEQ ID NO: 32 sets forth the amino acid sequence for residues 543 to 809 of SEQ ID NO: 1.

SEQ ID NO: 33 sets forth the amino acid sequence for residues 544 to 767 of SEQ ID NO: 2.

SEQ ID NO: 34 sets forth the amino acid sequence for a mutant TcdA, wherein residues 101, 269, 272, 285, 287, 460, 462, 541, 542, 543, 589, 655, and 700 may be any amino acid.

SEQ ID NO: 35 sets forth the amino acid sequence for a mutant TcdB, wherein 102, 270, 273, 286, 288, 384, 461, 463, 520, 543, 544, 587, 600, 653, 698, and 751 may be any amino acid.

SEQ ID NO: 36 sets forth the amino acid sequence for the variable light chain of a neutralizing antibody of *C. difficile* TcdA (A3-25 mAb).

SEQ ID NO: 37 sets forth the amino acid sequence for the variable heavy chain of a neutralizing antibody of *C. difficile* TcdA (A3-25 mAb).

SEQ ID NO: 38 sets forth the amino acid sequence for CDR1 of the variable light chain of neutralizing antibody of *C. difficile* TcdA (A3-25 mAb).

SEQ ID NO: 39 sets forth the amino acid sequence for CDR2 of the variable light chain of neutralizing antibody of *C. difficile* TcdA (A3-25 mAb).

SEQ ID NO: 40 sets forth the amino acid sequence for CDR3 of the variable light chain of neutralizing antibody of *C. difficile* TcdA (A3-25 mAb).

SEQ ID NO: 41 sets forth the amino acid sequence for CDR1 of the variable heavy chain of neutralizing antibody of *C. difficile* TcdA (A3-25 mAb).

SEQ ID NO: 42 sets forth the amino acid sequence for CDR2 of the variable heavy chain of neutralizing antibody of *C. difficile* TcdA (A3-25 mAb).

SEQ ID NO: 43 sets forth the amino acid sequence for CDR3 of the variable heavy chain of neutralizing antibody of *C. difficile* TcdA (A3-25 mAb).

SEQ ID NO: 44 sets forth a DNA sequence encoding SEQ ID NO: 3.

SEQ ID NO: 45 sets forth a DNA sequence encoding SEQ ID NO: 4.

SEQ ID NO: 46 sets forth a DNA sequence encoding SEQ ID NO: 5.

SEQ ID NO: 47 sets forth a DNA sequence encoding SEQ ID NO: 6.

SEQ ID NO: 48 sets forth the nucleotide sequence of immunostimulatory oligonucleotide ODN CpG 24555.

SEQ ID NO: 49 sets forth the amino acid sequence for the variable heavy chain of a *C. difficile* TcdB neutralizing antibody (B8-26 mAb).

SEQ ID NO: 50 sets forth the amino acid sequence for the signal peptide of the variable heavy chain of a *C. difficile* TcdB neutralizing antibody (B8-26 mAb).

SEQ ID NO: 51 sets forth the amino acid sequence for CDR1 of the variable heavy chain of a *C. difficile* TcdB neutralizing antibody (B8-26 mAb).

SEQ ID NO: 52 sets forth the amino acid sequence for CDR2 of the variable heavy chain of a *C. difficile* TcdB neutralizing antibody (B8-26 mAb).

SEQ ID NO: 53 sets forth the amino acid sequence for CDR3 of the variable heavy chain of a *C. difficile* TcdB neutralizing antibody (B8-26 mAb).

SEQ ID NO: 54 sets forth the amino acid sequence for the constant region of the variable heavy chain of a *C. difficile* TcdB neutralizing antibody (B8-26 mAb).

SEQ ID NO: 55 sets forth the amino acid sequence for the variable light chain of a *C. difficile* TcdB neutralizing antibody (B8-26 mAb).

SEQ ID NO: 56 sets forth the amino acid sequence for the signal peptide of the variable light chain of a *C. difficile* TcdB neutralizing antibody (B8-26 mAb).

SEQ ID NO: 57 sets forth the amino acid sequence for CDR1 of the variable light chain of a *C. difficile* TcdB neutralizing antibody (B8-26 mAb).

SEQ ID NO: 58 sets forth the amino acid sequence for CDR2 of the variable light chain of a *C. difficile* TcdB neutralizing antibody (B8-26 mAb).

SEQ ID NO: 59 sets forth the amino acid sequence for CDR3 of the variable light chain of a *C. difficile* TcdB neutralizing antibody (B8-26 mAb).

SEQ ID NO: 60 sets forth the amino acid sequence for the variable heavy chain of a *C. difficile* TcdB neutralizing antibody (B59-3 mAb).

SEQ ID NO: 61 sets forth the amino acid sequence for the signal peptide of the variable heavy chain of a *C. difficile* TcdB neutralizing antibody (B59-3 mAb).

SEQ ID NO: 62 sets forth the amino acid sequence for CDR1 of the variable heavy chain of a *C. difficile* TcdB neutralizing antibody (B59-3 mAb).

SEQ ID NO: 63 sets forth the amino acid sequence for CDR2 of the variable heavy chain of a *C. difficile* TcdB neutralizing antibody (B59-3 mAb).

SEQ ID NO: 64 sets forth the amino acid sequence for CDR3 of the variable heavy chain of a *C. difficile* TcdB neutralizing antibody (B59-3 mAb).

SEQ ID NO: 65 sets forth the amino acid sequence for the constant region of the variable heavy chain of a *C. difficile* TcdB neutralizing antibody (B59-3 mAb).

SEQ ID NO: 66 sets forth the amino acid sequence for the variable light chain of a *C. difficile* TcdB neutralizing antibody (B59-3 mAb).

SEQ ID NO: 67 sets forth the amino acid sequence for the signal peptide of the variable light chain of a *C. difficile* TcdB neutralizing antibody (B59-3 mAb).

SEQ ID NO: 68 sets forth the amino acid sequence for CDR1 of the variable light chain of a *C. difficile* TcdB neutralizing antibody (B59-3 mAb).

SEQ ID NO: 69 sets forth the amino acid sequence for CDR2 of the variable light chain of a *C. difficile* TcdB neutralizing antibody (B59-3 mAb).

SEQ ID NO: 70 sets forth the amino acid sequence for CDR3 of the variable light chain of a *C. difficile* TcdB neutralizing antibody (B59-3 mAb).

SEQ ID NO: 71 sets forth the amino acid sequence for the variable heavy chain of a *C. difficile* TcdB neutralizing antibody (B9-30 mAb).

SEQ ID NO: 72 sets forth the amino acid sequence for the signal peptide of the variable heavy chain of a *C. difficile* TcdB neutralizing antibody (B9-30 mAb).

SEQ ID NO: 73 sets forth the amino acid sequence for CDR1 of the variable heavy chain of a *C. difficile* TcdB neutralizing antibody (B9-30 mAb).

SEQ ID NO: 74 sets forth the amino acid sequence for CDR2 of the variable heavy chain of a *C. difficile* TcdB neutralizing antibody (B9-30 mAb).

SEQ ID NO: 75 sets forth the amino acid sequence for CDR3 of the variable heavy chain of a *C. difficile* TcdB neutralizing antibody (B9-30 mAb).

SEQ ID NO: 76 sets forth the amino acid sequence for the constant region of the variable heavy chain of a *C. difficile* TcdB neutralizing antibody (B9-30 mAb).

SEQ ID NO: 77 sets forth the amino acid sequence for the variable light chain of a *C. difficile* TcdB neutralizing antibody (B9-30 mAb).

SEQ ID NO: 78 sets forth the amino acid sequence for the signal peptide of the variable light chain of a *C. difficile* TcdB neutralizing antibody (B9-30 mAb).

SEQ ID NO: 79 sets forth the amino acid sequence for CDR1 of the variable light chain of a *C. difficile* TcdB neutralizing antibody (B9-30 mAb).

SEQ ID NO: 80 sets forth the amino acid sequence for CDR2 of the variable light chain of a *C. difficile* TcdB neutralizing antibody (B9-30 mAb).

SEQ ID NO: 81 sets forth the amino acid sequence for CDR3 of the variable light chain of a *C. difficile* TcdB neutralizing antibody (B9-30 mAb).

SEQ ID NO: 82 sets forth the amino acid sequence for a mutant TcdB, wherein a residue at positions 102, 270, 273, 286, 288, 384, 461, 463, 520, 543, 544, 587, 600, 653, 698, and 751 may be any amino acid.

SEQ ID NO: 83 sets forth the amino acid sequence for a mutant TcdA having a mutation at positions 269, 272, 285, 287, 460, 462, and 700, as compared to SEQ ID NO: 1, wherein the methionine at position 1 is absent.

SEQ ID NO: 84 sets forth the amino acid sequence for a mutant *C. difficile* toxin A having a mutation at positions 285, 287, and 700, as compared to SEQ ID NO: 1, wherein the methionine at position 1 is absent.

SEQ ID NO: 85 sets forth the amino acid sequence for a mutant *C. difficile* toxin B having a mutation at positions 270, 273, 286, 288, 461, 463, and 698, as compared to SEQ ID NO: 2, wherein the methionine at position 1 is absent.

SEQ ID NO: 86 sets forth the amino acid sequence for a mutant *C. difficile* toxin B having a mutation at positions 286, 288, and 698, as compared to SEQ ID NO: 2, wherein the methionine at position 1 is absent.

SEQ ID NO: 87 sets forth the amino acid sequence for wild-type *C. difficile* 2004013 TcdA.

SEQ ID NO: 88 sets forth the amino acid sequence for wild-type *C. difficile* 2004111 TcdA.

SEQ ID NO: 89 sets forth the amino acid sequence for wild-type *C. difficile* 2004118 TcdA.

SEQ ID NO: 90 sets forth the amino acid sequence for wild-type *C. difficile* 2004205 TcdA.

SEQ ID NO: 91 sets forth the amino acid sequence for wild-type *C. difficile* 2004206 TcdA.

SEQ ID NO: 92 sets forth the amino acid sequence for wild-type *C. difficile* 2005022 TcdA.

SEQ ID NO: 93 sets forth the amino acid sequence for wild-type *C. difficile* 2005088 TcdA.

SEQ ID NO: 94 sets forth the amino acid sequence for wild-type *C. difficile* 2005283 TcdA.

SEQ ID NO: 95 sets forth the amino acid sequence for wild-type *C. difficile* 2005325 TcdA.

SEQ ID NO: 96 sets forth the amino acid sequence for wild-type *C. difficile* 2005359 TcdA.

SEQ ID NO: 97 sets forth the amino acid sequence for wild-type *C. difficile* 2006017 TcdA.

SEQ ID NO: 98 sets forth the amino acid sequence for wild-type *C. difficile* 2007070 TcdA.

SEQ ID NO: 99 sets forth the amino acid sequence for wild-type *C. difficile* 2007217 TcdA.

SEQ ID NO: 100 sets forth the amino acid sequence for wild-type *C. difficile* 2007302 TcdA.

SEQ ID NO: 101 sets forth the amino acid sequence for wild-type *C. difficile* 2007816 TcdA.

SEQ ID NO: 102 sets forth the amino acid sequence for wild-type *C. difficile* 2007838 TcdA.

SEQ ID NO: 103 sets forth the amino acid sequence for wild-type *C. difficile* 2007858 TcdA.

SEQ ID NO: 104 sets forth the amino acid sequence for wild-type *C. difficile* 2007886 TcdA.

SEQ ID NO: 105 sets forth the amino acid sequence for wild-type *C. difficile* 2008222 TcdA.

SEQ ID NO: 106 sets forth the amino acid sequence for wild-type *C. difficile* 2009078 TcdA.

SEQ ID NO: 107 sets forth the amino acid sequence for wild-type *C. difficile* 2009087 TcdA.

SEQ ID NO: 108 sets forth the amino acid sequence for wild-type *C. difficile* 2009141 TcdA.

SEQ ID NO: 109 sets forth the amino acid sequence for wild-type *C. difficile* 2009292 TcdA.

SEQ ID NO: 110 sets forth the amino acid sequence for wild-type *C. difficile* 2004013 TcdB.

SEQ ID NO: 111 sets forth the amino acid sequence for wild-type *C. difficile* 2004111 TcdB.

SEQ ID NO: 112 sets forth the amino acid sequence for wild-type *C. difficile* 2004118 TcdB.

SEQ ID NO: 113 sets forth the amino acid sequence for wild-type *C. difficile* 2004205 TcdB.

SEQ ID NO: 114 sets forth the amino acid sequence for wild-type *C. difficile* 2004206 TcdB.

SEQ ID NO: 115 sets forth the amino acid sequence for wild-type *C. difficile* 2005022 TcdB.

SEQ ID NO: 116 sets forth the amino acid sequence for wild-type *C. difficile* 2005088 TcdB.

SEQ ID NO: 117 sets forth the amino acid sequence for wild-type *C. difficile* 2005283 TcdB.

SEQ ID NO: 118 sets forth the amino acid sequence for wild-type *C. difficile* 2005325 TcdB.

SEQ ID NO: 119 sets forth the amino acid sequence for wild-type *C. difficile* 2005359 TcdB.

SEQ ID NO: 120 sets forth the amino acid sequence for wild-type *C. difficile* 2006017 TcdB.

SEQ ID NO: 121 sets forth the amino acid sequence for wild-type *C. difficile* 2006376 TcdB.

SEQ ID NO: 122 sets forth the amino acid sequence for wild-type *C. difficile* 2007070 TcdB.

SEQ ID NO: 123 sets forth the amino acid sequence for wild-type *C. difficile* 2007217 TcdB.

SEQ ID NO: 124 sets forth the amino acid sequence for wild-type *C. difficile* 2007302 TcdB.

SEQ ID NO: 125 sets forth the amino acid sequence for wild-type *C. difficile* 2007816 TcdB.

SEQ ID NO: 126 sets forth the amino acid sequence for wild-type *C. difficile* 2007838 TcdB.

SEQ ID NO: 127 sets forth the amino acid sequence for wild-type *C. difficile* 2007858 TcdB.

SEQ ID NO: 128 sets forth the amino acid sequence for wild-type *C. difficile* 2007886 TcdB.

SEQ ID NO: 129 sets forth the amino acid sequence for wild-type *C. difficile* 2008222 TcdB.

SEQ ID NO: 130 sets forth the amino acid sequence for wild-type *C. difficile* 2009078 TcdB.

SEQ ID NO: 131 sets forth the amino acid sequence for wild-type *C. difficile* 2009087 TcdB.

SEQ ID NO: 132 sets forth the amino acid sequence for wild-type *C. difficile* 2009141 TcdB.

SEQ ID NO: 133 sets forth the amino acid sequence for wild-type *C. difficile* 2009292 TcdB.

SEQ ID NO: 134 sets forth the amino acid sequence for wild-type *C. difficile* 014 TcdA.

SEQ ID NO: 135 sets forth the amino acid sequence for wild-type *C. difficile* 015 TcdA.

SEQ ID NO: 136 sets forth the amino acid sequence for wild-type *C. difficile* 020 TcdA.

SEQ ID NO: 137 sets forth the amino acid sequence for wild-type *C. difficile* 023 TcdA.

SEQ ID NO: 138 sets forth the amino acid sequence for wild-type *C. difficile* 027 TcdA.

SEQ ID NO: 139 sets forth the amino acid sequence for wild-type *C. difficile* 029 TcdA.

SEQ ID NO: 140 sets forth the amino acid sequence for wild-type *C. difficile* 046 TcdA.

SEQ ID NO: 141 sets forth the amino acid sequence for wild-type *C. difficile* 014 TcdB.

SEQ ID NO: 142 sets forth the amino acid sequence for wild-type *C. difficile* 015 TcdB.

SEQ ID NO: 143 sets forth the amino acid sequence for wild-type *C. difficile* 020 TcdB.

SEQ ID NO: 144 sets forth the amino acid sequence for wild-type *C. difficile* 023 TcdB.

SEQ ID NO: 145 sets forth the amino acid sequence for wild-type *C. difficile* 027 TcdB.

SEQ ID NO: 146 sets forth the amino acid sequence for wild-type *C. difficile* 029 TcdB.

SEQ ID NO: 147 sets forth the amino acid sequence for wild-type *C. difficile* 046 TcdB.

SEQ ID NO: 148 sets forth the amino acid sequence for wild-type *C. difficile* 001 TcdA.

SEQ ID NO: 149 sets forth the amino acid sequence for wild-type *C. difficile* 002 TcdA.

SEQ ID NO: 150 sets forth the amino acid sequence for wild-type *C. difficile* 003 TcdA.

SEQ ID NO: 151 sets forth the amino acid sequence for wild-type *C. difficile* 004 TcdA.

SEQ ID NO: 152 sets forth the amino acid sequence for wild-type *C. difficile* 070 TcdA.

SEQ ID NO: 153 sets forth the amino acid sequence for wild-type *C. difficile* 075 TcdA.

SEQ ID NO: 154 sets forth the amino acid sequence for wild-type *C. difficile* 077 TcdA.

SEQ ID NO: 155 sets forth the amino acid sequence for wild-type *C. difficile* 081 TcdA.

SEQ ID NO: 156 sets forth the amino acid sequence for wild-type *C. difficile* 117 TcdA.

SEQ ID NO: 157 sets forth the amino acid sequence for wild-type *C. difficile* 131 TcdA.

SEQ ID NO: 158 sets forth the amino acid sequence for wild-type *C. difficile* 001 TcdB.

SEQ ID NO: 159 sets forth the amino acid sequence for wild-type *C. difficile* 002 TcdB.

SEQ ID NO: 160 sets forth the amino acid sequence for wild-type *C. difficile* 003 TcdB.

SEQ ID NO: 161 sets forth the amino acid sequence for wild-type *C. difficile* 004 TcdB.

SEQ ID NO: 162 sets forth the amino acid sequence for wild-type *C. difficile* 070 TcdB.

SEQ ID NO: 163 sets forth the amino acid sequence for wild-type *C. difficile* 075 TcdB.
SEQ ID NO: 164 sets forth the amino acid sequence for wild-type *C. difficile* 077 TcdB.
SEQ ID NO: 165 sets forth the amino acid sequence for wild-type *C. difficile* 081 TcdB.
SEQ ID NO: 166 sets forth the amino acid sequence for wild-type *C. difficile* 117 TcdB.
SEQ ID NO: 167 sets forth the amino acid sequence for wild-type *C. difficile* 131 TcdB.
SEQ ID NO: 168 sets forth the amino acid sequence for wild-type *C. difficile* 053 TcdA.
SEQ ID NO: 169 sets forth the amino acid sequence for wild-type *C. difficile* 078 TcdA.
SEQ ID NO: 170 sets forth the amino acid sequence for wild-type *C. difficile* 087 TcdA.
SEQ ID NO: 171 sets forth the amino acid sequence for wild-type *C. difficile* 095 TcdA.
SEQ ID NO: 172 sets forth the amino acid sequence for wild-type *C. difficile* 126 TcdA.
SEQ ID NO: 173 sets forth the amino acid sequence for wild-type *C. difficile* 053 TcdB.
SEQ ID NO: 174 sets forth the amino acid sequence for wild-type *C. difficile* 078 TcdB.
SEQ ID NO: 175 sets forth the amino acid sequence for wild-type *C. difficile* 087 TcdB.
SEQ ID NO: 176 sets forth the amino acid sequence for wild-type *C. difficile* 095 TcdB.
SEQ ID NO: 177 sets forth the amino acid sequence for wild-type *C. difficile* 126 TcdB.
SEQ ID NO: 178 sets forth the amino acid sequence for wild-type *C. difficile* 059 TcdA.
SEQ ID NO: 179 sets forth the amino acid sequence for wild-type *C. difficile* 059 TcdB.
SEQ ID NO: 180 sets forth the amino acid sequence for wild-type *C. difficile* 106 TcdA.
SEQ ID NO: 181 sets forth the amino acid sequence for wild-type *C. difficile* 106 TcdB.
SEQ ID NO: 182 sets forth the amino acid sequence for wild-type *C. difficile* 017 TcdB.
SEQ ID NO: 183 sets forth the amino acid sequence for a mutant TcdA having a mutation at positions 285, 287, 700, 972, and 978 as compared to SEQ ID NO: 1.
SEQ ID NO: 184 sets forth the amino acid sequence for a mutant TcdB having a mutation at positions 286, 288, 698, 970, and 976 as compared to SEQ ID NO: 2.
SEQ ID NO: 185 through SEQ ID NO: 195 each set forth the amino acid sequence for an exemplary mutant toxin.
SEQ ID NO: 196 through SEQ ID NO: 212 each set forth the amino acid sequence for an exemplary mutant toxin A.
SEQ ID NO: 213 through SEQ ID NO: 222 each set forth the amino acid sequence for an exemplary mutant toxin B.
SEQ ID NO: 223 through SEQ ID NO: 236 each set forth the amino acid sequence for an exemplary mutant toxin A.

SEQ ID NO: 237 through SEQ ID NO: 243 each set forth the amino acid sequence for an exemplary mutant toxin B.

SEQ ID NO: 244 through SEQ ID NO: 245 each set forth the amino acid sequence for an exemplary mutant toxin A.

SEQ ID NO: 246 through SEQ ID NO: 249 each set forth the amino acid sequence for an exemplary mutant toxin B.

SEQ ID NO: 250 through SEQ ID NO: 253 each set forth the amino acid sequence for an exemplary mutant toxin A.

SEQ ID NO: 254 sets forth the amino acid sequence for an exemplary mutant toxin.

SEQ ID NO: 255 through SEQ ID NO: 263 each set forth the amino acid sequence for an exemplary mutant toxin A.

SEQ ID NO: 264 through SEQ ID NO: 269 each set forth the amino acid sequence for an exemplary mutant toxin B.

SEQ ID NO: 270 through SEQ ID NO: 275 each set forth the amino acid sequence for an exemplary mutant toxin.

SEQ ID NO: 276 through SEQ ID NO: 323 each set forth the amino acid sequence for an exemplary mutant toxin A.

SEQ ID NO: 324 through SEQ ID NO: 373 each set forth the amino acid sequence for an exemplary mutant toxin B.

SEQ ID NO: 374 through SEQ ID NO: 421 each set forth the amino acid sequence for an exemplary mutant toxin A.

SEQ ID NO: 422 through SEQ ID NO: 471 each set forth the amino acid sequence for an exemplary mutant toxin B.

SEQ ID NO: 472 through SEQ ID NO: 519 each set forth the amino acid sequence for an exemplary mutant toxin A.

SEQ ID NO: 568 through SEQ ID NO: 615 each set forth the amino acid sequence for an exemplary mutant toxin B.

SEQ ID NO: 520 through SEQ ID NO: 567 each set forth the amino acid sequence for an exemplary mutant toxin A.

SEQ ID NO: 616 through SEQ ID NO: 663 each set forth the amino acid sequence for an exemplary mutant toxin B.

SEQ ID NO: 664 through SEQ ID NO: 711 each set forth the amino acid sequence for an exemplary mutant toxin A.

SEQ ID NO: 712 through SEQ ID NO: 761 each set forth the amino acid sequence for an exemplary mutant toxin B.

DETAILED DESCRIPTION

The inventors surprisingly discovered, among other things, a mutant *C. difficile* toxin A and toxin B, and methods thereof. The mutants are characterized, in part, by being immunogenic and exhibiting reduced cytotoxicity compared to a wild-type form of the respective toxin. The present invention also relates to immunogenic portions thereof, biological equivalents thereof, and isolated polynucleotides that include nucleic acid sequences encoding any of the foregoing.

The immunogenic compositions described herein unexpectedly demonstrated the ability to elicit novel neutralizing antibodies against *C. difficile* toxins and they may have the ability to confer active and/or passive protection against a *C. difficile* challenge. The novel antibodies are directed against various epitopes of toxin A and toxin B. The inventors further discovered that a combination of at least two of the neutralizing monoclonal antibodies can exhibit an unexpectedly synergistic effect in respective *in vitro* neutralization of toxin A and toxin B.

The inventive compositions described herein may be used to treat, prevent, decrease the risk of, decrease occurrences of, decrease severity of, and/or delay the outset of a *C. difficile* infection, *C. difficile* associated disease (CDAD), syndrome, condition, symptom, and/or complication thereof in a mammal, as compared to a mammal to which the composition was not administered.

Moreover, the inventors discovered a recombinant asporogenic *C. difficile* cell that can stably express the mutant *C. difficile* toxin A and toxin B, and novel methods for producing the same.

Immunogenic Compositions

In one aspect, the invention relates to an immunogenic composition that includes a mutant *C. difficile* toxin. The mutant *C. difficile* toxin includes an amino acid sequence having at least one mutation in a glucosyltransferase domain and at least one mutation in a cysteine protease domain, relative to the corresponding wild-type *C. difficile* toxin.

The term “wild-type,” as used herein, refers to the form found in nature. For example, a wild-type polypeptide or polynucleotide sequence is a sequence present in an organism that can be isolated from a source in nature and which has not been intentionally modified by human manipulation. The present invention also relates to

isolated polynucleotides that include nucleic acid sequences encoding any of the foregoing. In addition, the present invention relates to use of any of the foregoing compositions to treat, prevent, decrease the risk of, decrease severity of, decrease occurrences of, and/or delay the outset of a *C. difficile* infection, *C. difficile* associated disease, syndrome, condition, symptom, and/or complication thereof in a mammal, as compared to a mammal to which the composition is not administered, as well as methods for preparing said compositions.

As used herein, an "immunogenic composition" or "immunogen" refers to a composition that elicits an immune response in a mammal to which the composition is administered.

An "immune response" refers to the development of a beneficial humoral (antibody mediated) and/or a cellular (mediated by antigen-specific T cells or their secretion products) response directed against a *C. difficile* toxin in a recipient patient. The immune response may be humoral, cellular, or both.

The immune response can be an active response induced by administration of an immunogenic composition, an immunogen. Alternatively, the immune response can be a passive response induced by administration of antibody or primed T-cells.

The presence of a humoral (antibody-mediated) immune response can be determined, for example, by cell-based assays known in the art, such as a neutralizing antibody assay, ELISA, etc.

A cellular immune response is typically elicited by the presentation of polypeptide epitopes in association with Class I or Class II MHC molecules to activate antigen-specific CD4 + T helper cells and/or CD8 + cytotoxic T cells. The response may also involve activation of monocytes, macrophages, NK cells, basophils, dendritic cells, astrocytes, microglia cells, eosinophils or other components of innate immunity. The presence of a cell-mediated immunological response can be determined by proliferation assays (CD4 + T cells) or CTL (cytotoxic T lymphocyte) assays known in the art.

In one embodiment, an immunogenic composition is a vaccine composition. As used herein, a "vaccine composition" is a composition that elicits an immune response in a mammal to which the composition is administered. The vaccine composition may protect the immunized mammal against subsequent challenge by an immunizing agent or an immunologically cross-reactive agent. Protection can be complete or partial with

regard to reduction in symptoms or infection as compared to a non-vaccinated mammal under the same conditions.

The immunogenic compositions described herein are cross-reactive, which refers to having a characteristic of being able to elicit an effective immune response (e.g., humoral immune response) against a toxin produced by another *C. difficile* strain that is different from the strain from which the composition is derived. For example, the immunogenic compositions (e.g., derived from *C. difficile* 630) described herein may elicit cross-reactive antibodies that can bind to toxins produced by multiple strains of *C. difficile* (e.g., toxins produced by *C. difficile* R20291 and VPI10463). See, for example, Example 37. Cross-reactivity is indicative of the cross-protection potential of the bacterial immunogen, and vice versa.

The term "cross-protective" as used herein refers to the ability of the immune response induced by an immunogenic composition to prevent or attenuate infection by a different bacterial strain or species of the same genus. For example, an immunogenic composition (e.g., derived from *C. difficile* 630) described herein may induce an effective immune response in a mammal to attenuate a *C. difficile* infection and/or to attenuate a *C. difficile* disease caused by a strain other than 630 (e.g., *C. difficile* R20291) in the mammal.

Exemplary mammals in which the immunogenic composition or immunogen elicits an immune response include any mammals, such as, for example, mice, hamsters, primates, and humans. In a preferred embodiment, the immunogenic composition or immunogen elicits an immune response in a human to which the composition is administered.

As described above, toxin A (TcdA) and toxin B (TcdB) are homologous glucosyltransferases that inactivate small GTPases of the Rho/Rac/Ras family. The action of TcdA and TcdB on mammalian target cells depends on a multistep mechanism of receptor-mediated endocytosis, membrane translocation, autoproteolytic processing, and monoglucosylation of GTPases. Many of these functional activities have been ascribed to discrete regions within the primary sequence of the toxins, and the toxins have been imaged to show that these molecules are similar in structure.

The wild-type gene for TcdA has about 8130 nucleotides that encode a protein having a deduced molecular weight of about 308-kDa, having about 2710 amino acids. As used herein, a wild-type *C. difficile* TcdA includes a *C. difficile* TcdA from any wild-

type *C. difficile* strain. A wild-type *C. difficile* TcdA may include a wild-type *C. difficile* TcdA amino acid sequence having at least about 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, preferably about 98%, more preferably about 99% or most preferably about 100% identity to SEQ ID NO: 1 (full length) when optimally aligned, such as by the programs GAP or BESTFIT using default gap weights.

In a preferred embodiment, the wild-type *C. difficile* TcdA includes an amino acid sequence set forth in SEQ ID NO: 1, which describes the wild-type amino acid sequence for TcdA from *C. difficile* strain 630 (also disclosed in GenBank accession number YP_001087137.1 and/or CAJ67494.1). *C. difficile* strain 630 is known in the art as being a PCR-ribotype 012 strain. SEQ ID NO: 9 describes the wild-type gene for TcdA from *C. difficile* strain 630, which is also disclosed in GenBank accession number NC_009089.1.

Another example of a wild-type *C. difficile* TcdA includes an amino acid sequence set forth in SEQ ID NO: 15, which describes the wild-type amino acid sequence for TcdA from *C. difficile* strain R20291 (also disclosed in GenBank accession number YP_003217088.1). *C. difficile* strain R20291 is known in the art as being a hypervirulent strain and a PCR-ribotype 027 strain. The amino acid sequence for TcdA from *C. difficile* strain R20291 has about 98% identity to SEQ ID NO:1. SEQ ID NO: 16 describes the wild-type gene for TcdA from *C. difficile* strain R20291, which is also disclosed in GenBank accession number NC_013316.1.

An additional example of a wild-type *C. difficile* TcdA includes an amino acid sequence set forth in SEQ ID NO: 17, which describes the wild-type amino acid sequence for TcdA from *C. difficile* strain CD196 (also disclosed in GenBank accession number CBA61156.1). CD196 is a strain from a recent Canadian outbreak, and it is known in the art as a PCR-ribotype 027 strain. The amino acid sequence for TcdA from *C. difficile* strain CD196 has about 98% identity to SEQ ID NO: 1, and has about 100% identity to TcdA from *C. difficile* strain R20291. SEQ ID NO: 18 describes the wild-type gene for TcdA from *C. difficile* strain CD196, which is also disclosed in GenBank accession number FN538970.1.

Further examples of an amino acid sequence for a wild-type *C. difficile* TcdA include SEQ ID NO: 19, which describes the wild-type amino acid sequence for TcdA from *C. difficile* strain VPI10463 (also disclosed in GenBank accession number CAA63564.1). The amino acid sequence for TcdA from *C. difficile* strain VPI10463 has

about 100% (99.8%) identity to SEQ ID NO: 1. SEQ ID NO: 20 describes the wild-type gene for TcdA from *C. difficile* strain VPI10463, which is also disclosed in GenBank accession number X92982.1.

Additional examples of a wild-type *C. difficile* TcdA include TcdA from wild-type *C. difficile* strains obtainable from the Centers for Disease Control and Prevention (CDC, Atlanta, GA). The inventors discovered that the amino acid sequence of TcdA from wild-type *C. difficile* strains obtainable from the CDC include at least about 99.3% to 100% identity, when optimally aligned, to amino acid residues 1 to 821 of SEQ ID NO: 1 (TcdA from *C. difficile* 630). See Table 1.

The inventors also discovered that the amino acid sequence of TcdA from wild-type *C. difficile* strains may include at least about 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, 99%, to about 100% identity, when optimally aligned (e.g., when full, length sequences are optimally aligned) to SEQ ID NO: 1.

Table 1: wild-type *C. difficile* strains obtained from CDC and the percent identity of amino acid residues 1-821 of TcdA from the respective wild-type *C. difficile* strain to amino acid residues 1-821 of SEQ ID NO: 1, when optimally aligned.

Table 1: Wild-type *C. difficile* Strains from CDC	
C. difficile Strain ID	Approximate % Amino Acid Identity to Residues 1-821 of SEQ ID NO: 1
2004111	100
2004118	99.6
2004205	100
2004206	100
2005325	99.3
2005359	99.6
2006017	100
2007070	100
2007302	100
2007816	99.3
2007838	99.6
2007886	99.6
2008222	100
2009078	100
2009087	100
2009141	100
2009292	99.6

Accordingly, in one embodiment, the wild-type *C. difficile* TcdA amino acid sequence includes a sequence of at least about 500, 600, 700, or 800 contiguous residues, which has at least about 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, preferably about 98%, more preferably about 99%, or most preferably about 100% identity to a sequence of equal length between residues 1 to 900 of SEQ ID NO: 1 when optimally aligned, such as by the programs GAP or BESTFIT using default gap weights. Examples include strains described above (e.g., R20291, CD196, etc) and those listed in Table 1.

In another embodiment, the wild-type *C. difficile* TcdA amino acid sequence includes a sequence having at least about 90%, 91%, 92%, 93%, 94%, 95%, 96%, preferably about 97%, preferably about 98%, more preferably about 99% or most

preferably about 100% identity to any sequence selected from SEQ ID NOs: 87-109 when optimally aligned. See Table 1-a.

Table 1-a: Wild-type *C. difficile* Strains	
C. difficile Strain ID	Toxin A, SEQ ID NO:
2004013	SEQ ID NO: 87
2004111	SEQ ID NO: 88
2004118	SEQ ID NO: 89
2004205	SEQ ID NO: 90
2004206	SEQ ID NO: 91
2005022	SEQ ID NO: 92
2005088	SEQ ID NO: 93
2005283	SEQ ID NO: 94
2005325	SEQ ID NO: 95
2005359	SEQ ID NO: 96
2006017	SEQ ID NO: 97
2006376	N/A
2007070	SEQ ID NO: 98
2007217	SEQ ID NO: 99
2007302	SEQ ID NO: 100
2007816	SEQ ID NO: 101
2007838	SEQ ID NO: 102
2007858	SEQ ID NO: 103
2007886	SEQ ID NO: 104
2008222	SEQ ID NO: 105
2009078	SEQ ID NO: 106
2009087	SEQ ID NO: 107
2009141	SEQ ID NO: 108
2009292	SEQ ID NO: 109
001	SEQ ID NO: 148
002	SEQ ID NO: 149
003	SEQ ID NO: 150

012 (004)	SEQ ID NO: 151
014	SEQ ID NO: 134
015	SEQ ID NO: 135
017	
020	SEQ ID NO: 136
023	SEQ ID NO: 137
027	SEQ ID NO: 138
029	SEQ ID NO: 139
046	SEQ ID NO: 140
053	SEQ ID NO: 168
059	SEQ ID NO: 178
070	SEQ ID NO: 152
075	SEQ ID NO: 153
077	SEQ ID NO: 154
078	SEQ ID NO: 169
081	SEQ ID NO: 155
087	SEQ ID NO: 170
095	SEQ ID NO: 171
106	SEQ ID NO: 180
117	SEQ ID NO: 156
126	SEQ ID NO: 172
131	SEQ ID NO: 157
SE844	SEQ ID NO: 196
12087	SEQ ID NO: 197
K14	SEQ ID NO: 198
BI6	SEQ ID NO: 199
BI17	SEQ ID NO: 200
CH6230	SEQ ID NO: 201
SE881	SEQ ID NO: 202

The wild-type gene for TcdB has about 7098 nucleotides that encode a protein with a deduced molecular weight of about 270 kDa, having about 2366 amino acids. As used herein, a wild-type *C. difficile* TcdB includes a *C. difficile* TcdB from any wild-type *C. difficile* strain. A wild-type *C. difficile* TcdB may include a wild-type amino acid sequence having at least about 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, preferably about 98%, more preferably about 99% or most preferably about 100% identity to SEQ ID NO: 2 when optimally aligned, such as by the programs GAP or BESTFIT using default gap weights. In a preferred embodiment, the wild-type *C. difficile* TcdB includes an amino acid sequence set forth in SEQ ID NO: 2, which describes the wild-type amino acid sequence for TcdB from *C. difficile* strain 630 (also disclosed in GenBank accession number YP_001087135.1 and/or CAJ67492). SEQ ID NO: 10 describes the wild-type gene for TcdB from *C. difficile* strain 630, which is also disclosed in GenBank accession number NC_009089.1.

Another example of a wild-type *C. difficile* TcdB includes an amino acid sequence set forth in SEQ ID NO: 21, which describes the wild-type amino acid sequence for TcdB from *C. difficile* strain R20291 (also disclosed in GenBank accession number YP_003217086.1 and/or CBE02479.1). The amino acid sequence for TcdB from *C. difficile* strain R20291 has about 92% identity to SEQ ID NO: 2. SEQ ID NO: 22 describes the wild-type gene for TcdB from *C. difficile* strain R20291, which is also disclosed in GenBank accession number NC_013316.1.

An additional example of a wild-type *C. difficile* TcdB includes an amino acid sequence set forth in SEQ ID NO: 23, which describes the wild-type amino acid sequence for TcdB from *C. difficile* strain CD196 (also disclosed in GenBank accession number YP_003213639.1 and/or CBA61153.1). SEQ ID NO: 24 describes the wild-type gene for TcdB from *C. difficile* strain CD196, which is also disclosed in GenBank accession number NC_013315.1. The amino acid sequence for TcdB from *C. difficile* strain CD196 has about 92% identity to SEQ ID NO: 2.

Further examples of an amino acid sequence for a wild-type *C. difficile* TcdB include SEQ ID NO: 25, which describes the wild-type amino acid sequence for TcdB from *C. difficile* strain VPI10463 (also disclosed in GenBank accession number P18177 and/or CAA37298). The amino acid sequence for TcdB from *C. difficile* strain VPI10463 has 100% identity to SEQ ID NO: 2. SEQ ID NO: 26 describes the wild-type gene for

TcdB from *C. difficile* strain VPI10463, which is also disclosed in GenBank accession number X53138.1.

Additional examples of a wild-type *C. difficile* TcdB include TcdB from wild-type *C. difficile* strains obtainable from the Centers for Disease Control and Prevention (CDC, Atlanta, GA). The inventors discovered that the amino acid sequence of TcdB from wild-type *C. difficile* strains obtainable from the CDC include at least about 96% to 100% identity, when optimally aligned, to amino acid residue 1 to 821 of SEQ ID NO: 2 (TcdB from *C. difficile* 630). See Table 2.

Table 2: wild-type *C. difficile* strains obtained from CDC and the % identity of amino acid residues 1-821 of TcdB from the respective wild-type *C. difficile* strain to amino acid residues 1-821 of SEQ ID NO: 2, when optimally aligned.

Table 2: Wild-type *C. difficile* Strains from CDC	
C. difficile Strain ID	Approximate % Amino Acid Identity to Residues 1-821 of SEQ ID NO: 2
2004013	96.0
2004111	100
2004118	96.0
2004206	100
2005022	100
2005325	96.7
2007302	100
2007816	96.7
2008222	100
2009078	100
2009087	100
2009141	100

Accordingly, in one embodiment, a wild-type *C. difficile* TcdB amino acid sequence includes a sequence of at least about 500, 600, 700, or 800 contiguous residues, which has at least about 90%, 91%, 92%, 93%, 94%, 95%, 96%, preferably about 97%, preferably about 98%, more preferably about 99% or most preferably about 100% identity to a sequence of equal length between residues 1 to 900 of SEQ ID NO: 2 when optimally aligned, such as by the programs GAP or BESTFIT using default gap

weights. Examples include strains described above (e.g., R20291, CD196, etc) and those listed in Table 2.

In another embodiment, the wild-type *C. difficile* TcdB amino acid sequence includes a sequence having at least about 90%, 91%, 92%, 93%, 94%, 95%, 96%, preferably about 97%, preferably about 98%, more preferably about 99% or most preferably about 100% identity to any sequence selected from SEQ ID NOs: 110-133 when optimally aligned. See Table 2-a.

Table 2-a Wild-type *C. difficile* Strains	
C. difficile Strain ID	Toxin B, SEQ ID NO:
2004013	SEQ ID NO: 110
2004111	SEQ ID NO: 111
2004118	SEQ ID NO: 112
2004205	SEQ ID NO: 113
2004206	SEQ ID NO: 114
2005022	SEQ ID NO: 115
2005088	SEQ ID NO: 116
2005283	SEQ ID NO: 117
2005325	SEQ ID NO: 118
2005359	SEQ ID NO: 119
2006017	SEQ ID NO: 120
2006376	SEQ ID NO: 121
2007070	SEQ ID NO: 122
2007217	SEQ ID NO: 123
2007302	SEQ ID NO: 124
2007816	SEQ ID NO: 125
2007838	SEQ ID NO: 126
2007858	SEQ ID NO: 127
2007886	SEQ ID NO: 128
2008222	SEQ ID NO: 129
2009078	SEQ ID NO: 130
2009087	SEQ ID NO: 131
2009141	SEQ ID NO: 132
2009292	SEQ ID NO: 133
001	SEQ ID NO: 158
002	SEQ ID NO: 159
003	SEQ ID NO: 160
012 (004)	SEQ ID NO: 161
014	SEQ ID NO: 141

015	SEQ ID NO: 142
017	SEQ ID NO: 182
020	SEQ ID NO: 143
023	SEQ ID NO: 144
027	SEQ ID NO: 145
029	SEQ ID NO: 146
046	SEQ ID NO: 147
053	SEQ ID NO: 173
059	SEQ ID NO: 179
070	SEQ ID NO: 162
075	SEQ ID NO: 163
077	SEQ ID NO: 164
078	SEQ ID NO: 174
081	SEQ ID NO: 165
087	SEQ ID NO: 175
095	SEQ ID NO: 176
106	SEQ ID NO: 181
117	SEQ ID NO: 166
126	SEQ ID NO: 177
131	SEQ ID NO: 167

The genes for toxins A and B (*tcdA* and *tcdB*) are part of a 19.6-kb genetic locus (the pathogenicity locus, PaLoc) that includes 3 additional small open-reading frames (ORFs), *tcdD, tcdE*, and *tcdC*, and may be considered useful for virulence. The PaLoc is known to be stable and conserved in toxigenic strains. It is present at the same chromosomal integration site in all toxigenic strains that have been analyzed to date. In nontoxigenic strains, the pathogenicity locus (PaLoc) is not present. Accordingly, a characteristic of the wild-type *C. difficile* strains described herein is the presence of a pathogenicity locus. Another preferred characteristic of the wild-type *C. difficile* strains described herein is the production of both TcdA and TcdB.

In one embodiment, the wild-type *C. difficile* strain is a strain having a pathogenicity locus that is at least about 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, preferably about 98%, more preferably about 99% or most preferably about 100% identical to that of *C. difficile* 630 or VPI10463. The total pathogenicity locus sequence of *C. difficile* VPI10463, is registered at the EMBL database with the sequence accession number X92982, also shown in SEQ ID NO: 26. Strains in which the PaLoc is identical to that of the reference strain VPI10463 are referred to as toxinotype 0. Strains of toxinotypes I-VII, IX, XII-XV, and XVIII-XXIV produce both TcdA and TcdB despite variations in their toxin genes.

At the N-terminus of the toxins, the glucosyltransferase domain is located. The glucosyltransferase activity of the toxins is associated with the cytotoxic function of the toxins. Without being bound by mechanism or theory, the glucosyltransferase activity in both toxins is believed to catalyze the monoglucosylation of small GTP-binding proteins in the Rho/Rac/Ras superfamily. After glucosylation of these GTP binding proteins, cellular physiology is modified dramatically, resulting in a loss of structural integrity and disruption of essential signaling pathways of the host cells infected by the toxins. The Asp-Xaa-Asp (DXD) motif, which is involved with manganese, uridine diphosphate (UDP), and glucose binding, is a typical characteristic for the glucosyltransferase domain. Without being bound by mechanism or theory, it is believed that residues critical for catalytic activity, such as the DXD motif, do not vary between a TcdB from a known "historical" strain, such as 630, and a TcdB from a hypervirulent strain, such as R20291. The DXD motif is located at residues 285 to 287 of a wild-type *C. difficile* TcdA, according to the numbering of SEQ ID NO: 1, and at residues 286 to 288 of a wild-type *C. difficile* TcdB, according to the numbering of SEQ ID NO: 2.

Global alignment algorithms (e.g., sequence analysis programs) are known in the art and may be used to optimally align two or more amino acid toxin sequences to determine if the toxin includes a particular signature motif (e.g., DXD in the glucosyltransferase domain, DHC in the cysteine protease domain described below, etc.). The optimally aligned sequence(s) are compared to a respective reference sequence (e.g., SEQ ID NO:1 for TcdA or SEQ ID NO: 2 for TcdB) to determine the existence of the signature motif. "Optimal alignment" refers to an alignment giving the highest percent identity score. Such alignment can be performed using known sequence analysis programs. In one embodiment, a CLUSTAL alignment (such as CLUSTALW) under default parameters is used to identify suitable wild-type toxins by comparing the query sequence against the reference sequence. The relative numbering of the conserved amino acid residues is based on the residue numbering of the reference amino acid sequence to account for small insertions or deletions (for example, five amino acids of less) within the aligned sequence.

As used herein, the term "according to the numbering of" refers to the numbering of the residues of a reference sequence when the given amino acid or polynucleotide sequence is compared to the reference sequence. In other words, the number or residue position of a given polymer is designated with respect to the reference sequence rather than by the actual numerical position of the residue within the given amino acid or polynucleotide sequence.

For example, a given amino acid sequence, such as that of a hypervirulent wild-type *C. difficile* strain, can be aligned to a reference sequence (e.g., such as that of a historical wild-type *C. difficile* strain, e.g., 630) by introducing gaps, if necessary, to optimize residue matches between the two sequences. In these cases, although the gaps are present, the numbering of the residue in the given amino acid or polynucleotide sequence is made with respect to the reference sequence to which it has been aligned. As used herein, a "reference sequence" refers to a defined sequence used as a basis for a sequence comparison.

Unless stated otherwise, all references herein to amino acid positions of a TcdA refer to the numbering of SEQ ID NO: 1. Unless stated otherwise, all references herein to amino acid positions of a TcdB refer to the numbering of SEQ ID NO: 2.

The glucosyltransferase domain of TcdA, as used herein, may begin at exemplary residue 1, 101, or 102, and may end at exemplary residue 542, 516, or 293

of a wild-type *C. difficile* TcdA, e.g., SEQ ID NO: 1. Any minimum residue position may be combined with a maximum residue position between residues 1 and 542 of TcdA to define a sequence for the glucosyltransferase domain as long as the DXD motif region is included. For example, in one embodiment, the glucosyltransferase domain of TcdA includes SEQ ID NO: 27, which is identical to residues 101-293 of SEQ ID NO: 1, and it includes the DXD motif region. In another embodiment, the glucosyltransferase domain of TcdA includes SEQ ID NO: 28, which is identical to residues 1-542 of SEQ ID NO: 1.

The glucosyltransferase domain of TcdB, as used herein, may begin at exemplary residue 1, 101, or 102, and may end at exemplary residue 543, 516, or 293 of a wild-type *C. difficile* TcdB, e.g., SEQ ID NO: 2. Any minimum residue position may be combined with a maximum residue position between residues 1 and 543 of TcdB to define a sequence for the glucosyltransferase domain as long as the DXD motif region is included. For example, in one embodiment, the glucosyltransferase domain of TcdB includes SEQ ID NO: 29, which is identical to residues 101-293 of SEQ ID NO: 2, and it includes the DXD motif region. In another embodiment, the glucosyltransferase domain of TcdB includes SEQ ID NO: 30, which is identical to residues 1-543 of SEQ ID NO: 2.

Without being bound to theory or mechanism, it is believed that the N-terminus of TcdA and/or TcdB is cleaved by an autoproteolytic process for the glucosyltransferase domain to be translocated and released into the host cell cytosol, where it can interact with Rac/Ras/Rho GTPases. Wild-type *C. difficile* TcdA has been shown to be cleaved between L542 and S543. Wild-type *C. difficile* TcdB has been shown to be cleaved between L543 and G544.

The cysteine protease domain is associated with the autocatalytic proteolytic activity of the toxin. The cysteine protease domain is located downstream of the glucosyltransferase domain and may be characterized by the catalytic triad aspartate, histidine, and cysteine (*DHC*), e.g., D589, H655, and C700 of a wild-type TcdA, and D587, H653, and C698 of a wild-type TcdB. Without being bound by mechanism or theory, it is believed that the catalytic triad is conserved between a toxin from a "historical" strain, such as 630, and a TcdB from a hypervirulent strain, such as R20291.

The cysteine protease domain of TcdA, as used herein, may begin at exemplary residue 543, and may end at exemplary residue 809 769, 768, or 767 of a wild-type TcdA, e.g., SEQ ID NO: 1. Any minimum residue position may be combined with a maximum residue position between 543 and 809 of a wild-type TcdA to define a

sequence for the cysteine protease domain as long as the catalytic triad DHC motif region is included. For example, in one embodiment, the cysteine protease domain of TcdA includes SEQ ID NO: 32, which has the DHC motif region located at residues 47, 113, and 158 of SEQ ID NO: 32, which respectively correspond to D589, H655, and C700 of a wild-type TcdA according to the numbering of SEQ ID NO: 1. SEQ ID NO: 32 is identical to residues 543 to 809 of SEQ ID NO: 1, TcdA.

The cysteine protease domain of TcdB, as used herein, may begin at exemplary residue 544, and may end at exemplary residue 801, 767, 755, or 700 of a wild-type TcdB, e.g., SEQ ID NO: 2. Any minimum residue position may be combined with a maximum residue position between 544 and 801 of a wild-type TcdB to define a sequence for the cysteine protease domain as long as the catalytic triad DHC motif region is included. For example, in one embodiment, the cysteine protease domain of TcdB includes SEQ ID NO: 33, which includes the DHC motif region located at residues 44, 110, and 115 of SEQ ID NO: 33, which respectively correspond to D587, H653, and C698 of a wild-type TcdB according to the numbering of SEQ ID NO: 2. SEQ ID NO: 33 is identical to residues 544 to 767 of SEQ ID NO: 2, TcdB. In another embodiment, the cysteine protease domain of TcdB includes residues 544-801 of SEQ ID NO: 2, TcdB.

Mutant toxin

In the present invention, the immunogenic composition includes a mutant *C. difficile* toxin. The term "mutant," as used herein, refers to a molecule that exhibits a structure or sequence that differs from the corresponding wild-type structure or sequence, e.g., by having crosslinks as compared to the corresponding wild-type structure and/or by having at least one mutation, as compared to the corresponding wild-type sequence when optimally aligned, such as by the programs GAP or BESTFIT using default gap weights. The term "mutant" as used herein further includes a molecule that exhibits a functional property (e.g., abrogated glucosyltransferase and/or abrogated cysteine protease activity) that differs from the corresponding wild-type molecule.

A *C. difficile* toxin from any of the wild-type strains described above may be used as a source from which a mutant *C. difficile* toxin is produced. Preferably, *C. difficile* 630 is the source from which a mutant *C. difficile* toxin is produced.

The mutation may involve a substitution, deletion, truncation or modification of the wild type amino acid residue normally located at that position. Preferably, the

mutation is a non-conservative amino acid substitution. The present invention also contemplates isolated polynucleotides that include nucleic acid sequences encoding any of the mutant toxins described herein.

A "non-conservative" amino acid substitution, as used herein, refers to an exchange of an amino acid from one class for an amino acid from another class, according to the following Table 3:

Table 3: Amino Acid Classes

Class	Amino acid
Nonpolar:	Ala (A), Val (V), Leu (L), Ile (I), Pro (P), Met (M), Phe (F), Trp (W)
Uncharged polar:	Gly (G), Ser (S), Thr (T), Cys (C), Tyr (Y), Asn (N), Gln (Q)
Acidic:	Asp (D), Glu (E)
Basic:	Lys (K), Arg (R), His (H)

Examples of a non-conservative amino acid substitution include a substitution wherein an aspartic acid residue (Asp, D) is replaced by an alanine residue (Ala, A). Other examples include replacing an aspartic acid residue (Asp, D) with an asparagine residue (Asn, N); replacing an arginine (Arg, R), glutamic acid (Glu, E), lysine (Lys, K), and/or histidine (His, H) residue with an alanine residue (Ala, A).

A conservative substitution refers to an exchange between amino acids from the same class, for example, according to Table 3.

The mutant toxins of the invention may be prepared by techniques known in the art for preparing mutations, such as, for example, site-directed mutagenesis, mutagenesis using a mutagen (e.g., UV light), etc. Preferably, site-directed mutagenesis is used. Alternatively, a nucleic acid molecule having an objective sequence may be directly synthesized. Such chemical synthesis methods are known in the art.

In the present invention, the mutant *C. difficile* toxin includes at least one mutation in a glucosyltransferase domain, relative to the corresponding wild-type *C. difficile* toxin. In one embodiment, the glucosyltransferase domain includes at least two mutations. Preferably, the mutation decreases or abrogates glucosyltransferase enzyme activity of the toxin, as compared to the glucosyltransferase enzyme activity of the corresponding wild-type *C. difficile* toxin.

Exemplary amino acid residues in a glucosyltransferase domain of TcdA that may undergo a mutation include at least one of the following, or any combination thereof: W101, D269, R272, D285, D287, E460, R462, S541, and L542, as compared to a wild-type *C. difficile* TcdA, according to the numbering of SEQ ID NO: 1. Further exemplary amino acid residues that may undergo a mutation include E514, S517, and W519, as compared to a wild-type *C. difficile* TcdA, according to the numbering of SEQ ID NO: 1.

Exemplary mutations in a glucosyltransferase domain of TcdA include at least one of the following, or any combination thereof: W101A, D269A, R272A, D285A, D287A, E460A, R462A, S541A, and L542G, as compared to a wild-type *C. difficile* TcdA. In a preferred embodiment, the glucosyltransferase domain of TcdA includes a L542G mutation, as compared to a wild-type *C. difficile* TcdA. In another preferred embodiment, the glucosyltransferase domain of TcdA includes a D285A and a D287A mutation, as compared to a wild-type *C. difficile* TcdA.

Exemplary amino acid residues in a glucosyltransferase domain of TcdB that may undergo a mutation include at least one of the following, or any combination thereof: W102, D270, R273, D286, D288, N384, D461, K463, W520, and L543, as compared to a wild-type *C. difficile* toxin B, according to the numbering of SEQ ID NO: 2. Further exemplary amino acid residues that may undergo a mutation include E515, S518, and W520, as compared to a wild-type *C. difficile* toxin B, according to the numbering of SEQ ID NO: 2.

Exemplary mutations in a glucosyltransferase domain of TcdB include at least one of the following, or any combination thereof: W102A, D270A, D270N, R273A, D286A, D288A, N384A, D461A, D461R, K463A, K463E, W520A, and L543A, as compared to a wild-type *C. difficile* TcdB. In a preferred embodiment, the glucosyltransferase domain of TcdB includes a L543A, as compared to a wild-type *C. difficile* TcdB. In another preferred embodiment, the glucosyltransferase domain of TcdB includes a D286A and a D288A mutation, as compared to a wild-type *C. difficile* TcdB.

Any of the mutations described herein above may be combined with a mutation in a cysteine protease domain. In the present invention, the mutant *C. difficile* toxin includes at least one mutation in a cysteine protease domain, relative to the corresponding wild-type *C. difficile* toxin. Preferably, the mutation decreases or

abrogates cysteine protease activity of the toxin, as compared to the cysteine protease activity of the corresponding wild-type *C. difficile* toxin.

Exemplary amino acid residues in a cysteine protease domain of TcdA that may undergo a mutation include at least one of the following, or any combination thereof: S543, D589, H655, and C700, as compared to a wild-type *C. difficile* TcdA, according to the numbering of SEQ ID NO: 1. Exemplary mutations in a glucosyltransferase domain of TcdA include at least one of the following, or any combination thereof: S543A, D589A, D589N, H655A, C700A, as compared to a wild-type *C. difficile* TcdA. In a preferred embodiment, the cysteine protease domain of TcdA includes a C700A mutation, as compared to a wild-type *C. difficile* TcdA.

Exemplary amino acid residues in a cysteine protease domain of TcdB that may undergo a mutation include at least one of the following, or any combination thereof: G544, D587, H653, and C698, as compared to a wild-type *C. difficile* TcdB, according to the numbering of SEQ ID NO: 2. Exemplary mutations in a glucosyltransferase domain of TcdB include at least one of the following, or any combination thereof: G544A, D587A, D587N, H653A, C698A, as compared to a wild-type *C. difficile* TcdB. In a preferred embodiment, the cysteine protease domain of TcdB includes a C698A mutation, as compared to a wild-type *C. difficile* TcdB. Additional amino acid residues in a cysteine protease domain of TcdB that may undergo a mutation include: K600 and/or R751, as compared to a wild-type TcdB. Exemplary mutations include K600E and/or R751E.

Accordingly, the inventive mutant *C. difficile* toxin includes a glucosyltransferase domain having a mutation and a cysteine protease domain having a mutation, relative to the corresponding wild-type *C. difficile* toxin. In one embodiment, the mutant toxin includes at least one mutation in the glucosyltransferase domain and at least one mutation in the cysteine protease domain. In a preferred embodiment, a mutant toxin A includes at least a D285, D287, and C700 mutation. In a preferred embodiment, a mutant toxin B includes at least a D286, D288, and C698 mutation. The mutant toxins may include any further mutation, individually or in combination, described herein.

An exemplary mutant *C. difficile* TcdA includes a glucosyltransferase domain including SEQ ID NO: 29 having an amino acid substitution at positions 285 and 287, and a cysteine protease domain comprising SEQ ID NO: 32 having an amino acid substitution at position 158, relative to the corresponding wild-type *C. difficile* toxin A.

For example, such a mutant *C. difficile* TcdA includes the amino acid sequence set forth in SEQ ID NO: 4, wherein the initial methionine is optionally not present. In another embodiment, the mutant mutant *C. difficile* toxin A includes the amino acid sequence set forth in SEQ ID NO: 84.

Further examples of a mutant *C. difficile* toxin A include the amino acid sequence set forth in SEQ ID NO: 7, which has a D269A, R272A, D285A, D287A, E460A, R462A, and C700A mutation, as compared to SEQ ID NO: 1, wherein the initial methionine is optionally not present. In another embodiment, the mutant mutant *C. difficile* toxin A includes the amino acid sequence set forth in SEQ ID NO: 83.

Another exemplary mutant TcdA includes SEQ ID NO: 34, wherein the residue at positions 101, 269, 272, 285, 287, 460, 462, 541, 542, 543, 589, 655, and 700 may be any amino acid.

In some embodiments, the mutant *C. difficile* toxin exhibits decreased or abrogated autoproteolytic processing as compared to the corresponding wild-type *C. difficile* toxin. For example, a mutant *C. difficile* TcdA may include a mutation at one of the following residues, or any combination thereof: S541, L542 and/or S543, as compared to the corresponding wild-type *C. difficile* TcdA. Preferably, the mutant *C. difficile* TcdA includes at least one of the following mutations, or any combination thereof: S541A, L542G, and S543A, as compared to the corresponding wild-type *C. difficile* TcdA.

Another exemplary mutant *C. difficile* TcdA includes a S541A, L542, S543 and C700 mutation, as compared to the corresponding wild-type *C. difficile* TcdA.

An exemplary mutant *C. difficile* toxin B includes a glucosyltransferase domain comprising SEQ ID NO: 31 having an amino acid substitution at positions 286 and 288, and a cysteine protease domain comprising SEQ ID NO: 33 having an amino acid substitution at position 155, relative to the corresponding wild-type *C. difficile* toxin B. For example, such a mutant *C. difficile* TcdB includes the amino acid sequence set forth in SEQ ID NO: 6, wherein the initial methionine is optionally not present. In another embodiment, the mutant mutant *C. difficile* toxin A includes the amino acid sequence set forth in SEQ ID NO: 86.

Further examples of a mutant *C. difficile* TcdB include the amino acid sequence set forth in SEQ ID NO: 8, which has a D270A, R273A, D286A, D288A, D461A, K463A, and C698A mutation, as compared to SEQ ID NO: 2. SEQ ID NO: 8 wherein the initial

methionine is optionally not present. In another embodiment, the mutant mutant *C. difficile* toxin A includes the amino acid sequence set forth in SEQ ID NO: 85.

Another exemplary mutant TcdB includes SEQ ID NO: 35, wherein the residue at positions 101, 269, 272, 285, 287, 460, 462, 541, 542, 543, 589, 655, and 700 may be any amino acid.

As another example, a mutant *C. difficile* TcdB may include a mutation at positions 543 and/or 544, as compared to the corresponding wild-type *C. difficile* TcdB. Preferably, the mutant *C. difficile* TcdB includes a L543 and/or G544 mutation, as compared to the corresponding wild-type *C. difficile* TcdB. More preferably, the mutant *C. difficile* TcdB includes a L543G and/or G544A mutation, as compared to the corresponding wild-type *C. difficile* TcdB.

Another exemplary mutant *C. difficile* TcdB includes a L543G, G544A and C698 mutation, as compared to the corresponding wild-type *C. difficile* TcdB.

In one aspect, the invention relates to an isolated polypeptide having a mutation at any position from amino acid residue 1 to 1500 according to the numbering of SEQ ID NO: 2, to define an exemplary mutant *C. difficile* toxin B. For example, in one embodiment, the isolated polypeptide includes a mutation between amino acids residues 830 and 990 of SEQ ID NO: 2. Exemplary positions for mutations include positions 970 and 976 according to the numbering of SEQ ID NO: 2. Preferably, the mutation between residues 830 and 990 is a substitution. In one embodiment, the mutation is a non-conservative substitution wherein an Asp (D) and/or a Glu (E) amino acid residue is replaced by an amino acid residue that is not neutralized upon acidification, such as, for example, lysine (K), arginine (R), and histidine (H). Exemplary mutations include: E970K, E970R, E970H, E976K, E976R, E976H of SEQ ID NO: 2, to define a mutant *C. difficile* toxin B.

In one embodiment, the isolated polypeptide includes the following substitutions D286A/D288A/C698A/E970K/E976K (SEQ ID NO: 184). E970 and E976 are conserved in toxin B from all *C. difficile* strains observed (see Table 2-a, SEQ ID NOs: 110-133), except in ribotype 078 and ribotype 126 strains (see Table 35 and Table 37). In toxin B from ribotype 078 and ribotype 126 strains, there is a glycine-970 (G970) instead of glutamate-970. Accordingly, in one embodiment, the isolated polypeptide includes a mutation at G970 and E976, such as, for example, G970K and E976K. The

mutant toxins described above and herein may exhibit reduced cytotoxicity as compared to the corresponding wild-type toxin. See Examples 8 and 15).

In another aspect, the invention relates to an isolated polypeptide having a mutation at any position from amino acid residue 1 to 1500 according to the numbering of SEQ ID NO: 1, to define an exemplary mutant *C. difficile* toxin A. For example, in one embodiment, the isolated polypeptide includes a mutation between amino acids residues 832 and 992 of SEQ ID NO: 1. Exemplary positions for mutations include positions 972 and 978 according to the numbering of SEQ ID NO: 1. Preferably, the mutation between residues 832 and 992 is a substitution. In one embodiment, the mutation is a non-conservative substitution wherein an Asp (D) and/or a Glu (E) amino acid residue is replaced by an amino acid residue that is not neutralized upon acidification, such as, for example, lysine (K), arginine (R), and histidine (H). Exemplary mutations include: D972K, D972R, D972H, D978K, D978R, D978H of SEQ ID NO: 1, to define a mutant *C. difficile* toxin A.

In one embodiment, the isolated polypeptide includes the following substitutions D285A/D287A/C700A/D972K/D978K (SEQ ID NO: 183). D972 and D978 residues are conserved in toxin A from all *C. difficile* strains assessed (see Table 1-a, SEQ ID NOs: 87-109). The mutant toxins described above and herein may exhibit reduced cytotoxicity as compared to the corresponding wild-type toxin.

The following describes additional exemplary mutant toxins. In one embodiment, the mutant toxin TcdA includes (i) SEQ ID NO: 185 ; (ii) a polypeptide of SEQ ID NO:185 having at least 90%, 92%, 93%, 95%, 98%, 99% or 100% identity to SEQ ID NO:185 ;or (iii) a fragment of at least 250, 280 or 300 amino acids of SEQ ID NO:185. In another embodiment, the mutant toxin TcdB includes (iv) SEQ ID NO:186;(v) a polypeptide of SEQ ID NO:186 having at least 80%, 85%, 90%,, 92%, 93%, 95%, 98%, 99% or 100% identity to SEQ ID NO:186; or (vi) a fragment of at least 250, 280 or 300 amino acids of SEQ ID NO:186.

In one embodiment, the mutant toxin TcdA consists of less than 600, 675, 650, 625, 600, 575, 550, 525, 500, 475, 450, 425, 400, 375, 350, 325, 300, 275, 250, or 225 amino acids. In one embodiment, the mutant toxin consists of less than 800, 775, 750, 725, 700, 675, 650, 625, 600, 575, 550, or 525 amino acids. In one embodiment, the mutant toxin includes at least 200, 225, 250, 270, 280, 300 or 310 amino acids of SEQ ID NO:185 or at least 200, 225, 250, 270, 280, 300 or 310 amino acids of a polypeptide

having at least 80%, 85%, 90%, 92%, 95%, 98%, 99%, or 100% identity to SEQ ID NO:185. In one embodiment the mutant toxin includes at least 400, 425, 450, 475, 500, 525, 550, 575, 600 or 610 amino acids of SEQ ID NO: 186 or at least 400, 425, 450, 475, 500, 525, 550, 575, 600 or 610 amino acids of a polypeptide having at least 80%, 85%, 90%, 92%, 95%, 98%, 99%, or 100% identity to SEQ ID NO:186.

In one embodiment, the mutant toxin includes a fusion protein that includes A) (i) SEQ ID NO:185 ; (ii) a polypeptide of SEQ ID NO:185 having at least 90%, 92%, 93%, 95%, 98%, 99% or 100% identity to SEQ ID NO:185 ;or (iii) a fragment of at least 250, 280 or 300 amino acids of SEQ ID NO:185 fused to B) (iv) SEQ ID NO:186;(v) a polypeptide of SEQ ID NO:186 having at least 80%, 85%, 90%,, 92%, 93%, 95%, 98%, 99% or 100% identity to SEQ ID NO:186; or (vi) a fragment of at least 250, 280 or 300 amino acids of SEQ ID NO:186. In a further embodiment the N-terminus of SEQ ID NO: 185 is adjacent to the C-terminus of SEQ ID NO: 186. In a further embodiment the N-terminus of SEQ ID NO: 185 is adjacent to the N-terminus of SEQ ID NO: 186. In a further embodiment the C-terminus of SEQ ID NO:185 is adjacent to the C-terminus of SEQ ID NO:186. Further examples of a mutant toxin include a polypeptide having any one of the following amino acid sequences SEQ ID NO: 187, SEQ ID NO: 188, SEQ ID NO: 189, SEQ ID NO: 190, SEQ ID NO: 191, SEQ ID NO: 192, SEQ ID NO: 193, SEQ ID NO: 194, and SEQ ID NO: 195.

In another embodiment, the mutant toxin includes a fusion and/or hybrid polypeptide that includes any combination of amino acid sequences selected from any of the following: SEQ ID NO: 223, SEQ ID NO: 224, SEQ ID NO: 225, SEQ ID NO: 226, SEQ ID NO: 227, SEQ ID NO: 228, SEQ ID NO: 229, SEQ ID NO: 230, SEQ ID NO: 231, SEQ ID NO: 232, SEQ ID NO: 233, SEQ ID NO: 234, SEQ ID NO: 235, SEQ ID NO: 236. SEQ ID NO: 237, SEQ ID NO: 238, SEQ ID NO: 239, SEQ ID NO: 240, SEQ ID NO: 241, SEQ ID NO: 242, and SEQ ID NO: 243. For example, in one embodiment, the mutant toxin includes an amino acid sequence as set forth in any one of the following: SEQ ID NO: 254, SEQ ID NO: 270, SEQ ID NO: 271, SEQ ID NO: 272, SEQ ID NO: 273, SEQ ID NO: 274, or SEQ ID NO: 275.

Another example of a mutant toxin includes a fragment of a wild-type toxin. A "fragment" mutant toxin TcdA as used herein refers to a peptide sequence that has less consecutive amino acids total than the corresponding wild-type *C. difficile* toxin TcdA sequence, e.g., a sequence that includes less than 2710 consecutive amino acids total.

The fragment mutant toxin TcdA may further include a mutation of an amino acid residue as described herein. A "fragment" mutant toxin TcdB as used herein refers to a peptide sequence that has less consecutive amino acids total than the corresponding wild-type *C. difficile* toxin TcdB sequence, e.g., a sequence that includes less than 2366 consecutive amino acids total. The fragment mutant toxin TcdBmay further include a mutation of an amino acid residue as described herein. Such exemplary mutant toxin sequences include SEQ ID NO: 28, SEQ ID NO: 29, SEQ ID NO: 30, SEQ ID NO: 31, SEQ ID NO: 32, SEQ ID NO: 33. In one embodiment, the mutant toxin TcdA includes at least 200, 300, 400, 500, 600, 700, 800, 900, 1000, 1100, 1200, 1300, 1400, 1500, 1600, 1700, 1800, 1900, or 2000 consecutive amino acids of a wild-type mutant toxin A, as described herein, e.g., SEQ ID NO: 1. In another embodiment, a mutant toxin includes a fragment of a genetically mutated toxin A described herein. In one embodiment, the mutant toxin TcdB includes at least 200, 300, 400, 500, 600, 700, 800, 900, 1000, 1100, 1200, 1300, 1400, 1500, 1600, 1700, 1800, 1900, or 2000 consecutive amino acids of a wild-type mutant toxin B, as described herein, e.g., SEQ ID NO: 2. In another embodiment, a mutant toxin includes a fragment of a genetically mutated toxin B described herein. In one embodiment, the mutant toxin includes at most 3000, 2710, 2500, 2400, 2366, 2000, 1900, 1800, 1700, 1600, 1500, 1400, 1300, 1200, 1100, 1000, 900, 800, 700, 600, 500, 400, or 300 consecutive amino acids. Any minimum value may be combined with any maximum value to define a suitable range. In another embodiment, the mutant toxin is fused to at least one other peptide or at least one other mutant toxin a manner that results in the production of a hybrid molecule.

Additional exemplary fragment mutant toxin TcdA includes a polypeptide having any one of the amino acid sequences of SEQ ID NO: 374 through SEQ ID NO: 421. Further exemplary fragment mutant toxin TcdA includes a polypeptide having any one of the amino acid sequences of SEQ ID NO: 472 through SEQ ID NO: 519. Additional exemplary mutant toxin TcdB includes a polypeptide having any one of the amino acid sequences of SEQ ID NO: 422 through SEQ ID NO: 471. Further exemplary fragment mutant toxin TcdB includes a polypeptide having any one of the amino acid sequences of SEQ ID NO: 568 through SEQ ID NO: 615.

The following describes further exemplary mutant toxins. In one embodiment, the mutant toxin includes aTcdA which includes or consists of at least 3, at least 4, or at least 5 mutations at amino acid residues selected from the group consisting of: W101,

D287, E514, D285, S517, W519, and C700, e.g., according to the numbering of SEQ ID NO: 1. In additional embodiments; the TcdA mutants include or consist of at least 3, at least 4, or at least 5 mutations selected from the group consisting of: W101A, D287A, E514Q, D285A, S517A, W519A, and C700A substitutions and a W101 deletion.

Another exemplary mutant toxin TcdA includes the amino acid substitutions W101, D287A, and E514Q, e.g., according to the numbering of SEQ ID NO: 1. A further embodiment provides a TcdA protein including or consisting of the amino acid substitutions W101A, D287A, E514Q, and W519A. Another specific embodiment of the invention is a TcdA protein including or consisting of the amino acid substitutions W101A, D287A, E514Q, W519A, and C700A.

In another embodiment, the mutant toxin TcdA includes the mutations W101A, D287A, E514Q and D285A, e.g., according to the numbering of SEQ ID NO: 1. In another embodiment, the mutant toxin TcdA includes the mutations W101A, D287A, E514Q and S517A.

In another embodiment, a further mutation may be added to the mutant TcdA, e.g. a C700A mutation. In additional embodiments, up to 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, or 20 further mutations may be added to any of the mutant toxin TcdA embodiments described herein.

Further examples of a mutant toxin TcdA includes the amino acid sequence as set forth in SEQ ID NO: 203, SEQ ID NO: 204, SEQ ID NO: 205, SEQ ID NO: 206, SEQ ID NO: 207, SEQ ID NO: 208, SEQ ID NO: 209, or SEQ ID NO: 211. In another embodiment, the mutant toxin TcdA includes the amino acid sequence SEQ ID NO: 210. In yet another embodiment, the mutant toxin TcdA includes a mutation at positions W101, D287, E514, W519 and C700; wherein W101 is replaced with any amino acid except tryptophan, D287 is replaced with any amino acid but aspartic acid, E514 is replaced with any amino acid but glutamic acid, W519 is replaced with any amino acid but tryptophan and C700 is replaced with any amino acid but cysteine, as set forth in SEQ ID NO: 212.

Additional examples of a mutant toxin TcdA include a polypeptide having an amino acid sequence that is at least 85%, at least 90%, at least 95%, at least 97%, at least 98%, or at (east 99% identical to the original reference sequence (e.g. SEQ ID NO: 203, SEQ ID NO: 204, SEQ ID NO: 205, SEQ ID NO: 206, SEQ ID NO: 207, SEQ ID NO: 208, SEQ ID NO: 209, SEQ ID NO: 210, SEQ ID NO: 211 or SEQ ID NO:

212 or SEQ ID NO: 82, SEQ ID NO: 83, SEQ ID NO: 84, SEQ ID NO: 85 or SEQ ID NO: 86).

In a further embodiment, mutant toxin TcdA includes mutations at at most than 12 amino acid residues, at most than 11 amino acid residues, at most than 10 amino acid residues, at most than 9 amino acid residues, at most than 8 amino acid residues, at most than 7 amino acid residues, at most than 6 amino acid residues, at most than 5 amino acid residues, at most than 4 amino acid residues, at most than 3 amino acid residues, at most than 2 amino acid residues, or 1 amino acid residue, for example, relative to SEQ ID NO: 203, SEQ ID NO: 204, SEQ ID NO: 205, SEQ ID NO: 206, SEQ ID NO: 207, SEQ ID NO: 208, SEQ ID NO: 209, SEQ ID NO: 210, SEQ ID NO: 211 and SEQ ID NO: 212 or SEQ ID NO: 82, SEQ ID NO: 83, SEQ ID NO: 84, SEQ ID NO: 85 or SEQ ID NO: 86.

The following describes further exemplary mutant toxins. In one embodiment, the mutant toxin is a mutant TcdB that that includes at least 3, at least 4, or at least 5 mutations at amino acid residues selected from the group consisting of: W102, D288, E515, D286, S518, W520, and C698, according to the numbering of SEQ ID NO: 2. In another embodiment, the mutant toxin TcdB includes at least 3, at least 4, or at least 5 mutations selected from the group consisting of: W102A, D288A, E515Q, D286A, S518A, W520A, and C698A substitutions and a W102 deletion. In one embodiment, the mutant toxin TcdB includes the amino acid sequence as set forth in SEQ ID NO: 213, SEQ ID NO: 214, SEQ ID NO: 215, SEQ ID NO: 216, SEQ ID NO: 217, SEQ ID NO: 218, SEQ ID NO: 219, SEQ ID NO: 220, or SEQ ID NO: 221. In yet another embodiment, the mutant toxin TcdB includes a mutation at positions W102, D288, E515, W520 and C698; wherein W102 is replaced with any amino acid except tryptophan, D288 is replaced with any amino acid but aspartic acid, E515 is replaced with any amino acid but glutamic acid, W520 is replaced with any amino acid but tryptophan and C698 is replaced with any amino acid but cysteine, as set forth in SEQ ID NO: 222.

Additional examples of a mutant toxin TcdB include a polypeptide having an amino acid sequence that is at least 85%, at least 90%, at least 95%, at least 97%, at least 98%, or at (east 99% identical to the original reference sequence SEQ ID NO: 213, SEQ ID NO: 214, SEQ ID NO: 215, SEQ ID NO: 216, SEQ ID NO: 217, SEQ ID NO: 218, SEQ ID NO: 219, SEQ ID NO: 220, SEQ ID NO: 221, or SEQ ID NO: 222.

In a further embodiment, mutant toxin TcdB includes mutations at at most than 12 amino acid residues, at most than 11 amino acid residues, at most than 10 amino acid residues, at most than 9 amino acid residues, at most than 8 amino acid residues, at most than 7 amino acid residues, at most than 6 amino acid residues, at most than 5 amino acid residues, at most than 4 amino acid residues, at most than 3 amino acid residues, at most than 2 amino acid residues, or 1 amino acid residue, for example, relative to SEQ ID NO: 213, SEQ ID NO: 214, SEQ ID NO: 215, SEQ ID NO: 216, SEQ ID NO: 217, SEQ ID NO: 218, SEQ ID NO: 219, SEQ ID NO: 220, SEQ ID NO: 221, and/or SEQ ID NO: 222.

Additional exemplary mutant toxin TcdA includes a polypeptide having any one of the amino acid sequences of SEQ ID NO: 276 through SEQ ID NO: 323. Additional exemplary mutant toxin TcdB includes a polypeptide having any one of the amino acid sequences of SEQ ID NO: 324 through SEQ ID NO: 373.

The following describes further exemplary mutant toxins. In one embodiment, the mutant toxin TcdA includes an amino acid sequence: (a) having 50% or more identity (e.g. 60%, 65%, 70%, 75%, 80%, 85%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, 98.5%, 99%, 99.5%, 99.8%, 99.9%, or 100%) to SEQ ID NO: 224 or SEQ ID NO: 245; and/or b) that is a fragment of at least "n" consecutive amino acids of SEQ ID NO: 224 or SEQ ID NO: 245, wherein "n" is 7 or more (e.g. 8, 10, 12, 14, 16, 18, 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100, 150, 250, 300, 400, 500, 540, or more).or of a polypeptide having 80% or more identity to SEQ ID NO: 224 or SEQ ID NO: 245 and that comprises an epitope of SEQ ID NO: 224 and/or SEQ ID NO: 245.

In one embodiment, the mutant toxin TcdA includes the amino acid sequence set forth in SEQ ID NO: 223, SEQ ID NO: 224, SEQ ID NO: 225, SEQ ID NO: 226, SEQ ID NO: 227, SEQ ID NO: 228, SEQ ID NO: 229, SEQ ID NO: 230, SEQ ID NO: 231, SEQ ID NO: 232, SEQ ID NO: 233, SEQ ID NO: 234, SEQ ID NO: 235, or SEQ ID NO: 236. Additional exemplary embodiments of a mutant toxin TcdA includes the amino acid sequence set forth in any of the following: SEQ ID NO: 244, SEQ ID NO: 245, SEQ ID NO: 250, SEQ ID NO: 251, SEQ ID NO: 252, SEQ ID NO: 253, SEQ ID NO: 254, SEQ ID NO: 255, SEQ ID NO: 256, SEQ ID NO: 257, SEQ ID NO: 258, SEQ ID NO: 259, SEQ ID NO: 260, SEQ ID NO: 261, SEQ ID NO: 262, and/or SEQ ID NO: 263.

In one embodiment, the mutant toxin TcdB includes an amino acid sequence (a) having 80% or more identity to SEQ ID NO: 238 or SEQ ID NO: 247; and/or b) that is a

fragment of at least 7 consecutive amino acids of SEQ ID NO: 238 or SEQ ID NO: 247, or of a polypeptide having 80% or more identity to SEQ ID NO: 238 or SEQ ID NO: 247 and that comprises an epitope of SEQ ID NO: 238 or SEQ ID NO: 247.

In one embodiment, the mutant toxin TcdB includes an amino acid sequence: (a) having 50% or more identity (e.g. 60%, 65%, 70%, 75%, 80%, 85%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, 98.5%, 99%, 99.5%, 99.8%, 99.9%, or more) to SEQ ID NO: 238 or SEQ ID NO: 247; and/or (b) that is a fragment of at least "n" consecutive amino acids of SEQ ID NO: 238 or SEQ ID NO: 247, or of a polypeptide having 50% or more identity to SEQ ID NO: 238 or SEQ ID NO: 247, wherein "n" is 7 or more (e.g. 8, 10, 12, 14, 16, 18, 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100, 150, 250, 300, 400, 500, 540, or more).

In one embodiment, the mutant toxin TcdB includes the amino acid sequence set forth in SEQ ID NO: 237, SEQ ID NO: 238, SEQ ID NO: 239, SEQ ID NO: 240, SEQ ID NO: 241, SEQ ID NO: 242, or SEQ ID NO: 243. Additional exemplary embodiments of a mutant toxin TcdB includes the amino acid sequence set forth in any of the following: SEQ ID NO: 246, SEQ ID NO: 247, SEQ ID NO: 248, SEQ ID NO: 249, SEQ ID NO: 264, SEQ ID NO: 265, SEQ ID NO: 266, SEQ ID NO: 267, SEQ ID NO: 268, and/or SEQ ID NO: 269.

Additional exemplary mutant toxin TcdA includes a polypeptide having any one of the amino acid sequences of SEQ ID NO: 520 through SEQ ID NO: 567. Additional exemplary mutant toxin TcdB includes a polypeptide having any one of the amino acid sequences of SEQ ID NO: 616 through SEQ ID NO: 663.

The following describes yet additional exemplary mutant toxins. In one embodiment, the mutant toxin TcdA includes a polypeptide having any one of the amino acid sequences of SEQ ID NO: 664 through SEQ ID NO: 711. Additional exemplary mutant toxin TcdB includes a polypeptide having any one of the amino acid sequences of SEQ ID NO: 712 through SEQ ID NO: 761.

The polypeptides of the invention may include an initial methionine residue, in some cases as a result of a host cell-mediated process. Depending on, for example, the host cell used in a recombinant production procedure and/or the fermentation or growth conditions of the host cell, it is known in the art that the N-terminal methionine encoded by the translation initiation codon may be removed from a polypeptide after

translation in cells or the N-terminal methionine may remain present in the isolated polypeptide.

Accordingly, in one aspect, the invention relates to an isolated polypeptide including the amino acid sequence set forth in SEQ ID NO: 4, wherein the initial methionine (at position 1) is optionally not present. In one embodiment, the initial methionine of SEQ ID NO: 4 is absent. In one aspect, the invention relates to an isolated polypeptide including the amino acid sequence set forth in SEQ ID NO: 84, which is identical to SEQ ID NO: 4, but for an absence of the initial methionine.

In another aspect, the isolated polypeptide includes the amino acid sequence set forth in SEQ ID NO: 6, wherein the initial methionine (at position 1) is optionally not present. In one embodiment, the initial methionine of SEQ ID NO: 6 is absent. In one aspect, the invention relates to an isolated polypeptide including the amino acid sequence set forth in SEQ ID NO: 86, which is identical to SEQ ID NO: 6, but for an absence of the initial methionine.

In a further aspect, the isolated polypeptide includes the amino acid sequence set forth in SEQ ID NO: 7, wherein the initial methionine (at position 1) is optionally not present. In one embodiment, the invention relates to an isolated polypeptide including the amino acid sequence set forth in SEQ ID NO: 83, which is identical to SEQ ID NO: 7, but for an absence of the initial methionine. In yet another aspect, the isolated polypeptide includes the amino acid sequence set forth in SEQ ID NO: 8, wherein the initial methionine (at position 1) is optionally not present. In one embodiment, the isolated polypeptide includes the amino acid sequence set forth in SEQ ID NO: 85, which is identical to SEQ ID NO: 8, but for an absence of the initial methionine.

In one aspect, the invention relates to an immunogenic composition including SEQ ID NO: 4, wherein the initial methionine (at position 1) is optionally not present. In another aspect, the invention relates to an immunogenic composition including SEQ ID NO: 6, wherein the initial methionine (at position 1) is optionally not present. In a further aspect, the invention relates to an immunogenic composition including SEQ ID NO: 7, wherein the initial methionine (at position 1) is optionally not present. In yet another aspect, the invention relates to an immunogenic composition including SEQ ID NO: 8, wherein the initial methionine (at position 1) is optionally not present.

In another aspect, the invention relates to an immunogenic composition including SEQ ID NO: 83. In one aspect, the invention relates to an immunogenic composition

including SEQ ID NO: 84. In one aspect, the invention relates to an immunogenic composition including SEQ ID NO: 85. In another aspect, the invention relates to an immunogenic composition including SEQ ID NO: 86.

Cytotoxicity

In addition to generating an immune response in a mammal, the immunogenic compositions described herein also have reduced cytotoxicity compared to the corresponding wild-type *C. difficile* toxin. Preferably, the immunogenic compositions are safe and have minimal (e.g., about a 6-8 $\log_{10}$ reduction) to no cytotoxicity, relative to the cytotoxicity of a respective wild-type toxin, for administration in mammals.

As used herein, the term cytotoxicity is a term understood in the art and refers to apoptotic cell death and/or a state in which one or more usual biochemical or biological functions of a cell are aberrantly compromised, as compared to an identical cell under identical conditions but in the absence of the cytotoxic agent. Toxicity can be quantitated, for example, in cells or in mammals as the amount of an agent needed to induce 50% cell death (i.e., EC_{50} or ED_{50}, respectively) or by other methods known in the art.

Assays for indicating cytotoxicity are known in the art, such as cell rounding assays (see, for example, Kuehne et al. Nature. 2010 Oct 7;467(7316):711-3). The action of TcdA and TcdB causes cells to round (e.g., lose morphology) and die, and such a phenomenon is visible by light microscopy. See, for example, Figure 9.

Additional exemplary cytotoxicity assays known in the art include glucosylation assays relating to phosphorimaging of Ras labeled with [^{14}C]glucose assays (as described in Busch et al., J Biol Chem. 1998 Jul 31;273(31):19566-72), and preferably the *in vitro* cytotoxicity assay described in the Examples below wherein EC_{50} may refer to a concentration of an immunogenic composition that exhibits at least about 50% of cytopathogenic effect (CPE) in a cell, preferably a human diploid fibroblast cell (e.g., IMR90 cell (ATCC CCL-186™), as compared to an identical cell under identical conditions in the absence of the toxin. The *in vitro* cytotoxicity assay may also be used to assess the concentration of a composition that inhibits at least about 50% of a wild-type *C. difficile* toxin-induced cytopathogenic effect (CPE) in a cell, preferably a human diploid fibroblast cell (e.g., IMR90 cell (ATCC CCL-186™), as compared to an identical cell under identical conditions in the absence of the toxin. Additional exemplary cytotoxicity assays include those described in Doern et al., J Clin Microbiol. 1992 Aug;30(8):2042-6. Cytotoxicity can also be determined by measuring ATP levels in cells treated with toxin. For example, a luciferase based substrate such as CELLTITERGLO® (Promega) may be used, which emits luminescence measured as a

relative light unit (RLU). In such an assay, cell viability may be directly proportional to the amount of ATP in the cells or the RLU values.

In one embodiment, the cytotoxicity of the immunogenic composition is reduced by at least about 1000, 2000, 3000, 4000, 5000-, 6000-, 7000-, 8000-, 9000-, 10000-, 11000-, 12000-, 13000-fold, 14000-fold, 15000-fold, or more, as compared to the corresponding wild-type *C. difficile* toxin. See, for example, Table 20.

In another embodiment, the cytotoxicity of the immunogenic composition is reduced by at least about 2-$\log_{10}$, more preferably by about 3-$\log_{10}$, and most preferably by about 4-$\log_{10}$ or more, relative to the corresponding wild-type toxin under identical conditions. For example, a mutant *C. difficile* TcdB may have an EC_{50} value of about 10^{-9} g/ml as measured in a standard cytopathic effect assay (CPE), as compared to an exemplary wild-type *C. difficile* TcdB which may have an EC_{50} value of at least about 10^{-12} g/ml. See, for example, Tables 7A, 7B, 8A and 8B in the Examples section below.

In yet another embodiment, the cytotoxicity of the mutant *C. difficile* toxin has an EC_{50} of at least about 50 µg/ml, 100 µg/ml, 200 µg/ml, 300 µg/ml, 400 µg/ml, 500 µg/ml, 600 µg/ml, 700 µg/ml, 800 µg/ml, 900 µg/ml, 1000 µg/ml or greater, as measured by, for example, an *in vitro* cytotoxicity assay, such as one described herein. Accordingly, in a preferred embodiment, the immunogenic compositions and mutant toxins are biologically safe for administration to mammals.

Without being bound by mechanism or theory, a TcdA having a D285 and D287 mutation, as compared to a wild-type TcdA, and a TcdB having a D286 and a D288 mutation, as compared to a wild-type TcdB, were expected to be defective in glycosyltransferase activity and therefore defective in inducing a cytopathic effect. In addition, a toxin having a mutation in the DHC motif was expected to be defective in autocatalytic processing, and therefore be without any cytotoxic effects.

However, the inventors surprisingly discovered, among other things, that exemplary mutant TcdA having SEQ ID NO: 4 and exemplary mutant TcdB having SEQ ID NO: 6 unexpectedly exhibited cytotoxicity (albeit significantly reduced from wild-type *C. difficile* 630 toxins) despite exhibiting dysfunctional glucosyltransferase activity and dysfunctional cysteine protease activity. Without being bound by mechanism or theory, the mutant toxins are believed to effect cytotoxicity through a novel mechanism. Nevertheless, the exemplary mutant TcdA having SEQ ID NO: 4 and exemplary mutant TcdB having SEQ ID NO: 6 were surprisingly immunogenic. See Examples below.

Crosslinking

Although chemical crosslinking of a wild-type toxin has a potential to fail in inactivating the toxin, the inventors further discovered that chemically crosslinking at least one amino acid of a mutant toxin further reduced cytotoxicity of the mutant toxin, relative to an identical mutant toxin lacking chemical crosslinks, and relative to the corresponding wild-type toxin. Preferably, the mutant toxin is purified before contact with the chemical crosslinking agent.

Moreover, despite a potential of chemical crosslinking agents to alter useful epitopes, the inventors surprisingly discovered that a genetically modified mutant *C. difficile* toxin having at least one amino acid chemically crosslinked resulted in immunogenic compositions that elicited multiple neutralizing antibodies or binding fragments thereof. Accordingly, epitopes associated with neutralizing antibody molecules were unexpectedly retained following chemical crosslinking.

Crosslinking (also referred to as "chemical inactivation" or "inactivation" herein) is a process of chemically joining two or more molecules by a covalent bond. The terms "crosslinking reagents," "crosslinking agents," and "crosslinkers" refer to molecules that are capable of reacting with and/or chemically attaching to specific functional groups (primary amines, sulhydryls, carboxyls, carbonyls, etc) on peptides, polypeptides, and/or proteins. In one embodiment, the molecule may contain two or more reactive ends that are capable of reacting with and/or chemically attaching to specific functional groups (primary amines, sulhydryls, carboxyls, carbonyls, etc) on peptides, polypeptides, and/or proteins. Preferably, the chemical crosslinking agent is water-soluble. In another preferred embodiment, the chemical crosslinking agent is a heterobifunctional crosslinker. In another embodiment, the chemical crosslinking agent is not a bifunctional crosslinker. Chemical crosslinking agents are known in the art.

In a preferred embodiment, the crosslinking agent is a zero-length crosslinking agent. A "zero-length" crosslinker refers to a crosslinking agent that will mediate or produce a direct crosslink between functional groups of two molecules. For example, in the crosslinking of two polypeptides, a zero-length crosslinker will result in the formation of a bridge, or a crosslink between a carboxyl group from an amino acid side chain of one polypeptide, and an amino group of another polypeptide, without integrating extrinsic matter. Zero-length crosslinking agents can catalyze, for example, the

formation of ester linkages between hydroxyl and carboxyl moieties, and/or the formation of amide bonds between carboxyl and primary amino moieties.

Exemplary suitable chemical crosslinking agents include formaldehyde; formalin; acetaldehyde; propionaldehyde; water-soluble carbodiimides (RN=C=NR'), which include 1-Ethyl-3-(3-Dimethylaminopropyl)-Carbodiimide (EDC), 1-Ethyl-3-(3-Dimethylaminopropyl)-Carbodiimide Hydrochloride, 1-Cyclohexyl-3-(2-morpholinyl-(4-ethyl)carbodiimide metho-p-toluenesulfonate (CMC), N,N′-dicyclohexylcarbodiimide (DCC), and N,N′-diisopropylcarbodiimide (DIC), and derivatives thereof; and N-hydroxysuccinimide (NHS); phenylglyoxal; and/or UDP-dialdehyde.

Preferably, the crosslinking agent is EDC. When a mutant *C. difficile* toxin polypeptide is chemically modified by EDC (e.g., by contacting the polypeptide with EDC), in one embodiment, the polypeptide includes **(a)** at least one crosslink between a side chain of an aspartic acid residue of the polypeptide and a side chain of a lysine residue of the polypeptide. In one embodiment, the polypeptide includes **(b)** at least one crosslink between a side chain of a glutamic acid residue of the polypeptide and a side chain of a lysine residue of the polypeptide. In one embodiment, the polypeptide includes **(c)** at least one crosslink between the carboxyl group at the C-terminus of the polypeptide and the amino group of the N-terminus of the polypeptide. In one embodiment, the polypeptide includes **(d)** at least one crosslink between the carboxyl group at the C-terminus of the polypeptide and a side chain of a lysine residue of the polypeptide. In one embodiment, the polypeptide includes **(e)** at least one crosslink between a side chain of an aspartic acid residue of the polypeptide and a side chain of a lysine residue of a second isolated polypeptide. In one embodiment, the polypeptide includes **(f)** at least one crosslink between a side chain of a glutamic acid residue of the polypeptide and a side chain of a lysine residue of a second isolated polypeptide. In one embodiment, the polypeptide includes **(g)** at least one crosslink between the carboxyl group at the C-terminus of the polypeptide and the amino group of the N-terminus of a second isolated polypeptide. In one embodiment, the polypeptide includes **(h)** at least one crosslink between the carboxyl group at the C-terminus of the polypeptide and a side chain of a lysine residue of a second isolated polypeptide. See, for example, Figure 24 and Figure 25.

The "second isolated polypeptide" refers to any isolated polypeptide that is present during the reaction with EDC. In one embodiment, the second isolated

polypeptide is a mutant *C. difficile* toxin polypeptide having an identical sequence as the first isolated polypeptide. In another embodiment, the second isolated polypeptide is a mutant *C. difficile* toxin polypeptide having a different sequence from the first isolated polypeptide.

In one embodiment, the polypeptide includes at least two modifications selected from the (a)-(d) modifications. In an exemplary embodiment, the polypeptide includes **(a)** at least one crosslink between a side chain of an aspartic acid residue of the polypeptide and a side chain of a lysine residue of the polypeptide and **(b)** at least one crosslink between a side chain of a glutamic acid residue of the polypeptide and a side chain of a lysine residue of the polypeptide. In a further embodiment, the polypeptide includes at least three modifications selected from the (a)-(d) modifications. In yet a further embodiment, the polypeptide includes the (a), (b), (c), and (d) modifications.

When more than one mutant polypeptide is present during chemical modification by EDC, in one embodiment, the resulting composition includes at least one of any of the (a)-(h) modifications. In one embodiment, the composition includes at least two modifications selected from the (a)-(h) modifications. In a further embodiment, the composition includes at least three modifications selected from the (a)-(h) modifications. In yet a further embodiment, the composition includes at least four modifications selected from the (a)-(h) modifications. In another embodiment, the composition includes at least one of each of the (a)-(h) modifications.

In an exemplary embodiment, the resulting composition includes **(a)** at least one crosslink between a side chain of an aspartic acid residue of the polypeptide and a side chain of a lysine residue of the polypeptide; and **(b)** at least one crosslink between a side chain of a glutamic acid residue of the polypeptide and a side chain of a lysine residue of the polypeptide. In one embodiment, the composition further includes **(c)** at least one crosslink between the carboxyl group at the C-terminus of the polypeptide and the amino group of the N-terminus of the polypeptide; and **(d)** at least one crosslink between the carboxyl group at the C-terminus of the polypeptide and a side chain of a lysine residue of the polypeptide.

In another exemplary embodiment, the resulting composition includes **(e)** at least one crosslink between a side chain of an aspartic acid residue of the polypeptide and a side chain of a lysine residue of a second isolated polypeptide; **(f)** at least one crosslink between a side chain of a glutamic acid residue of the polypeptide and a side chain of a

lysine residue of a second isolated polypeptide; **(g)** at least one crosslink between the carboxyl group at the C-terminus of the polypeptide and the amino group of the N-terminus of a second isolated polypeptide; and **(h)** at least one crosslink between the carboxyl group at the C-terminus of the polypeptide and a side chain of a lysine residue of a second isolated polypeptide.

In a further exemplary embodiment, the resulting composition includes **(a)** at least one crosslink between a side chain of an aspartic acid residue of the polypeptide and a side chain of a lysine residue of the polypeptide; **(b)** at least one crosslink between a side chain of a glutamic acid residue of the polypeptide and a side chain of a lysine residue of the polypeptide; **(e)** at least one crosslink between a side chain of an aspartic acid residue of the polypeptide and a side chain of a lysine residue of a second isolated polypeptide; and **(f)** at least one crosslink between a side chain of a glutamic acid residue of the polypeptide and a side chain of a lysine residue of a second isolated polypeptide.

In a preferred embodiment, the chemical crosslinking agent includes formaldehyde, more preferably, an agent including formaldehyde in the absence of lysine. Glycine or other appropriate compound with a primary amine can be used as the quencher in crosslinking reactions. Accordingly, in another preferred embodiment, the chemical agent includes formaldehyde and use of glycine.

In yet another preferred embodiment, the chemical crosslinking agent includes EDC and NHS. As is known in the art, NHS may be included in EDC coupling protocols. However, the inventors surprisingly discovered that NHS may facilitate in further decreasing cytotoxicity of the mutant *C. difficile* toxin, as compared to the corresponding wild-type toxin, as compared to a genetically mutated toxin, and as compared to a genetically mutated toxin that has been chemically crosslinked by EDC. See, for example, Example 22. Accordingly, without being bound by mechanism or theory, a mutant toxin polypeptide having a beta-alanine moiety linked to a side chain of at least one lysine residue of the polypeptide (e.g., resulting from a reaction of the mutant toxin polypeptide, EDC, and NHS) may facilitate in further decreasing cytotoxicity of the mutant toxin, as compared to, for example, a *C. difficile* toxin (wild-type or mutant) wherein a beta-alanine moiety is absent.

Use of EDC and/or NHS may also include use of glycine or other appropriate compound with a primary amine as the quencher. Any compound having a primary

amine may be used as a quencher, such as, for example glycine methyl ester and alanine. In a preferred embodiment, the quencher compound is a non-polymeric hydrophilic primary amine. Examples of a non-polymeric hydrophilic primary amine include, for example, amino sugars, amino alcohols, and amino polyols. Specific examples of a non-polymeric hydrophilic primary amine include glycine, ethanolamine, glucamine, amine functionalized polyethylene glycol, and amine functionalized ethylene glycol oligomers.

In one aspect, the invention relates to a mutant *C. difficile* toxin polypeptide having at least one amino acid side chain chemically modified by EDC and a non-polymeric hydrophilic primary amine, preferably glycine. The resulting glycine adducts (e.g., from a reaction of triple mutant toxins treated with EDC, NHS, and quenched with glycine) may facilitate in decreasing cytotoxicity of the mutant toxin as compared to the corresponding wild-type toxin.

In one embodiment, when a mutant *C. difficile* toxin polypeptide is chemically modified by EDC and glycine, the polypeptide includes at least one modification when the polypeptide is modified by EDC (e.g., at least one of any of the (a)-(h) modifications described above), and at least one of the following exemplary modifications: **(i)** a glycine moiety linked to the carboxyl group at the C-terminus of the polypeptide; **(j)** a glycine moiety linked to a side chain of at least one aspartic acid residue of the polypeptide; and **(k)** a glycine moiety linked to a side chain of at least one glutamic acid residue of the polypeptide. See, for example, Figure 24 and Figure 25.

In one embodiment, at least one amino acid of the mutant *C. difficile* TcdA is chemically crosslinked and/or at least one amino acid of the mutant *C. difficile* TcdB is chemically crosslinked. Any of the mutant toxins descrbed herein may be chemically crosslinked. In another embodiment, at least one amino acid of SEQ ID NO: 4, SEQ ID NO: 6, SEQ ID NO: 7, and/or SEQ ID NO: 8 is chemically crosslinked. In one embodiment, at least one amino acid residue of a polypeptide having the amino acid sequence of any of SEQ ID NOs: 1 through SEQ ID NO: 761 is crosslinked. In another embodiment, at least one amino acid residue of a polypeptide having the amino acid sequence of any of SEQ ID NOs: 183 through SEQ ID NO: 761 includes a modification as described above, e.g., any of the (a)-(k) modifications, such as (a) at least one crosslink between a side chain of an aspartic acid residue of the polypeptide and a side chain of a lysine residue of the polypeptide.

For example, the at least one amino acid may be chemically crosslinked by an agent that includes a carbodiimide, such as EDC. Carbodiimides may form a covalent bond between free carboxyl (e.g., from the side chains of aspartic acid and/or glutamic acid) and amino groups (e.g., in the side chain of lysine residues) to form stable amide bonds.

As another example, the at least one amino acid may be chemically crosslinked by an agent that includes NHS. NHS ester-activated crosslinkers may react with primary amines (e.g., at the N-terminus of each polypeptide chain and/or in the side chain of lysine residues) to yield an amide bond.

In another embodiment, the at least one amino acid may be chemically crosslinked by an agent that includes EDC and NHS. For example, in one embodiment, the invention relates to an isolated polypeptide having the amino acid sequence set forth in SEQ ID NO: 4, wherein the methionine residue at position 1 is optionally not present, wherein the polypeptide includes at least one amino acid side chain chemically modified by EDC and NHS. In another embodiment, the invention relates to an isolated polypeptide having the amino acid sequence set forth in SEQ ID NO: 6, wherein the methionine residue at position 1 is optionally not present, wherein the polypeptide includes at least one amino acid side chain chemically modified by EDC and NHS. In yet another embodiment, the invention relates to an isolated polypeptide having the amino acid sequence set forth in SEQ ID NO: 84, SEQ ID NO: 86, SEQ ID NO: 83, SEQ ID NO: 85, SEQ ID NO: 7, or SEQ ID NO: 8. The polypeptide is modified by contacting the polypeptide with EDC and NHS. See, for example, Figure 24 and Figure 25.

When a mutant *C. difficile* toxin polypeptide is chemically modified by (e.g., by contacting) EDC and NHS, in one embodiment, the polypeptide includes at least one modification when the polypeptide is modified by EDC (e.g., at least one of any of the (a)-(h) modifications described above), and **(I)** a beta-alanine moiety linked to a side chain of at least one lysine residue of the polypeptide.

In another aspect, the invention relates to a mutant *C. difficile* toxin polypeptide wherein the polypeptide includes at least one amino acid side chain chemically modified by EDC, NHS, and a non-polymeric hydrophilic primary amine, preferably glycine. In one embodiment, the polypeptide includes at least one modification when the polypeptide is modified by EDC (e.g., at least one of any of the (a)-(h) modifications described above), at least one modification when the polypeptide is modified by glycine

(e.g., at least one of any of the (i)-(k) modifications described above), and (l) a beta-alanine moiety linked to a side chain of at least one lysine residue of the polypeptide. See, for example, Figure 24 and Figure 25.

In one aspect, the invention relates to a mutant *C. difficile* toxin polypeptide, wherein a side chain of at least one lysine residue of the polypeptide is linked to a beta-alanine moiety. In one embodiment, a side chain of a second lysine residue of the polypeptide is linked to a side chain of an aspartic acid residue and/or to a side chain of a glutamic acid residue. The "second" lysine residue of the polypeptide includes a lysine residue of the polypeptide that is not linked to a beta-alanine moiety. The side chain of an aspartic acid and/or the side chain of a glutamic acid to which the second lysine residue is linked may be that of the polypeptide to form an intra-molecular crosslink, or that of a second polypeptide to form an inter-molecular crosslink. In another embodiment, a side chain of at least one aspartic acid residue and/or a side chain of at least one glutamic acid residue of the polypeptide is linked to a glycine moiety. The aspartic acid residue and/or the glutamic acid residue that is linked to a glycine moiety is not also linked to a lysine residue.

In another aspect, the invention relates to a mutant *C. difficile* toxin wherein at least one amino acid side chain of a wild-type *C. difficile* toxin is chemically modified. In one embodiment, at least one amino acid side chain of a wild-type *C. difficile* toxin A and/or at least one amino acid side chain of a wild-type *C. difficile* toxin B is chemically modified by EDC. For example, in one embodiment, TcdA (SEQ ID NO: 1) and/or Tcdb (SEQ ID NO: 2) is chemically modified by EDC. In another embodiment, the wild-type toxin is chemically modified by EDC and NHS. In one embodiment, the mutant toxin includes a chemically modified wild-type toxin A, wherein the wild-type toxin A is any one described in Table 1-a. In another embodiment, the mutant toxin includes a chemically modified wild-type toxin B, wherein the wild-type toxin B is any one described in Table 2-a.

As yet another example of a chemically crosslinked mutant *C. difficile* toxin polypeptide, the at least one amino acid may be chemically crosslinked by an agent that includes formaldehyde. Formaldehyde may react with the amino group of an N-terminal amino acid residue and the side-chains of arginine, cysteine, histidine, and lysine. Formaldehyde and glycine may form a Schiff-base adduct, which may attach to primary

N-terminal amino groups, arginine, and tyrosine residues, and to a lesser degree asparagine, glutamine, histidine, and tryptophan residues.

A chemical crosslinking agent is said to reduce cytotoxicity of a toxin if the treated toxin has less toxicity (e.g., about 100%, 99%, 95%, 90%, 80%, 75%, 60%, 50%, 25%, or 10% less toxicity) than untreated toxin under identical conditions, as measured, for example, by an *in vitro* cytotoxicity assay, or by animal toxicity.

Preferably, the chemical crosslinking agent reduces cytotoxicity of the mutant *C. difficile* toxin by at least about a 2-$\log_{10}$ reduction, more preferably about a 3-$\log_{10}$ reduction, and most preferably about a 4-$\log_{10}$ or more, relative to the mutant toxin under identical conditions but in the absence of the chemical crosslinking agent. As compared to the wild-type toxin, the chemical crosslinking agent preferably reduces cytotoxicity of the mutant toxin by at least about a 5-$\log_{10}$ reduction, about a 6-$\log_{10}$ reduction, about a 7-$\log_{10}$ reduction, about an 8-$\log_{10}$ reduction, or more.

In another preferred embodiment, the chemically inactivated mutant *C. difficile* toxin exhibits EC_{50} value of greater than or at least about 50 µg/ml, 100 µg/ml, 200 µg/ml, 300 µg/ml, 400 µg/ml, 500 µg/ml, 600 µg/ml, 700 µg/ml, 800 µg/ml, 900 µg/ml, 1000 µg/ml or greater, as measured by, for example, an *in vitro* cytotoxicity assay, such as one described herein.

Reaction conditions for contacting the mutant toxin with the chemical crosslinking agent are within the scope of expertise of one skilled in the art, and the conditions may vary depending on the agent used. However, the inventors surprisingly discovered optimal reaction conditions for contacting a mutant *C. difficile* toxin polypeptide with a chemical crosslinking agent, while retaining functional epitopes and decreasing cytotoxicity of the mutant toxin, as compared to the corresponding wild-type toxin.

Preferably, the reaction conditions are selected for contacting a mutant toxin with the crosslinking agent, wherein the mutant toxin has a minimum concentration of about 0.5, 0.75, 1.0, 1.25, 1.5, 1.75, 2.0 mg/ml to a maximum of about 3.0, 2.5, 2.0, 1.5, or 1.25 mg/ml. Any minimum value may be combined with any maximum value to define a range of suitable concentrations of a mutant toxin for the reaction. Most preferably, the mutant toxin has a concentration of about 1.0 – 1.25 mg/ml for the reaction.

In one embodiment, the agent used in the reaction has a minimum concentration of about 1 mM, 2 mM, 3 mM, 4 mM, 5 mM, 10 mM, 15 mM, 20 mM, 30 mM, 40 mM, or 50 mM, and a maximum concentration of about 100 mM, 90 mM, 80 mM, 70 mM, 60

mM, or 50 mM. Any minimum value may be combined with any maximum value to define a range of suitable concentrations of the chemical agent for the reaction.

In a preferred embodiment wherein the agent includes formaldehyde, the concentration used is preferably any concentration between about 2 mM to 80 mM, most preferably about 40 mM. In another preferred embodiment wherein the agent includes EDC, the concentration used is preferably any concentration between about 1.3 mM to about 13 mM, more preferably about 2 mM to 3 mM, most preferably about 2.6 mM. In one embodiment, the concentration of EDC is at most 5 g/L, 4 g/L, 3 g/L, 2.5 g/L, 2 g/L, 1.5 g/L, 1.0 g/L, 0.5 g/L based on the total reaction volume, preferably at most 1 g/L, more preferably at most 0.5 g/L.

Exemplary reaction times in which the mutant toxin is contacted with the chemical crosslinking agent include a minimum of about 0.5, 1, 2, 3, 4, 5, 6, 12, 24, 36, 48, or 60 hours, and a maximum of about 14 days, 12 days, 10 days, 7 days, 5 days, 3 days, 2 days, 1 day, or 12 hours, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2, or 1 hour. Any minimum value may be combined with any maximum value to define a range of suitable reaction times.

In a preferred embodiment, the step of contacting the mutant toxin with the chemical crosslinking agent occurs for a period of time that is sufficient to reduce cytotoxicity of the mutant *C. difficile* toxin to an EC_{50} value of at least about 1000 µg/ml in a suitable human cell, e.g., IMR-90 cells, in a standard *in vitro* cytotoxicity assay, as compared to an identical mutant toxin in the absence of the crosslinking agent. More preferably, the reaction step is carried out for a time that is at least twice as long, and most preferably at least three times as long or more, as the period of time sufficient to reduce the cytotoxicity of the mutant toxin to an EC_{50} value of at least about 1000 µg/ml in a suitable human cell. In one embodiment, the reaction time does not exceed about 168 hours (or 7 days).

For example, in one embodiment wherein the agent includes formaldehyde, the mutant toxin is preferably contacted with the agent for about 12 hours, which was shown to be an exemplary period of time that was sufficient to reduce cytotoxicity of the mutant *C. difficile* toxin to an EC_{50} value of at least about 1000 µg/ml in a suitable human cell, e.g., IMR-90 cells, in a standard *in vitro* cytotoxicity assay, as compared to an identical mutant toxin in the absence of the crosslinking agent. In a more preferred embodiment, the reaction is carried out for about 48 hours, which is at least about three

times as long as a sufficient period of time for the reaction. In such an embodiment, the reaction time is preferably not greater than about 72 hours.

In another embodiment wherein the agent includes EDC, the mutant toxin is preferably contacted with the agent for about 0.5 hours, more preferably at least about 1 hour, or most preferably about 2 hours. In one embodiment, the mutant toxin is contacted with EDC for at most about 5 hours, preferably at most about 3 hours, more preferably at most about 2 hours. In such an embodiment, the reaction time is preferably not greater than about 6 hours.

Exemplary pH at which the mutant toxin is contacted with the chemical crosslinking agent include a minimum of about pH 5.5, 6.0, 6.5, 7.0, or 7.5, and a maximum of about pH 8.5, 8.0, 7.5, 7.0, or 6.5. Any minimum value may be combined with any maximum value to define a range of suitable pH. Preferably, the reaction occurs at pH 6.5 to 7.5, preferably at pH 7.0.

Exemplary temperatures at which the mutant toxin is contacted with the chemical crosslinking agent include a minimum of about 2°C, 4°C, 10°C, 20°C, 25°C, or 37°C, and a maximum temperature of about 40°C, 37°C, 30°C, 27°C, 25°C, or 20°C. Any minimum value may be combined with any maximum value to define a range of suitable reaction temperature. Preferably, the reaction occurs at about 20°C to 30°C, most preferably at about 25°C.

The immunogenic compositions described above may include one mutant *C. difficile* toxin (A or B). Accordingly, the immunogenic compositions can occupy separate vials (e.g., a separate vial for a composition including mutant *C. difficile* toxin A and a separate vial for a composition including mutant *C. difficile* toxin B) in the preparation or kit. The immunogenic compositions may be intended for simultaneous, sequential, or separate use.

In another embodiment, the immunogenic compositions described above may include both mutant *C. difficile* toxins (A and B). Any combination of mutant *C. difficile* toxin A and mutant *C. difficile* toxin B described may be combined for an immunogenic composition. Accordingly, the immunogenic compositions can be combined in a single vial (e.g., a single vial containing both a composition including mutant *C. difficile* TcdA and a composition including mutant *C. difficile* TcdB). Preferably, the immunogenic compositions include a mutant *C. difficile* TcdA and a mutant *C. difficile* TcdB.

For example, in one embodiment, the immunogenic composition includes SEQ ID NO: 4 and SEQ ID NO: 6, wherein at least one amino acid of each of SEQ ID NO: 4 and SEQ ID NO: 6 is chemically crosslinked. In another embodiment, the immunogenic composition includes a mutant *C. difficile* toxin A, which includes SEQ ID NO: 4 or SEQ ID NO: 7, and a mutant *C. difficile* toxin B, which comprises SEQ ID NO: 6 or SEQ ID NO: 8, wherein at least one amino acid of each of the mutant *C. difficile* toxins is chemically crosslinked.

In another embodiment, the immunogenic composition includes any sequence selected from SEQ ID NO: 4, SEQ ID NO: 84, and SEQ ID NO: 83, and any sequence seletected from SEQ ID NO: 6, SEQ ID NO: 86, and SEQ ID NO: 85. In another embodiment, the immunogenic composition includes SEQ ID NO: 84 and an immunogenic composition including SEQ ID NO: 86. In another embodiment, the immunogenic composition includes SEQ ID NO: 83 and an immunogenic composition including SEQ ID NO: 85. In another embodiment, the immunogenic composition includes SEQ ID NO: 84, SEQ ID NO: 83, SEQ ID NO: 86, and SEQ ID NO: 85.

In another embodiment, the immunogenic composition includes a polypeptide having any one sequence selected from SEQ ID NO: 1 to SEQ ID NO: 761, and a second polypeptide having any one sequence selected from SEQ ID NO: 1 to SEQ ID NO: 761.

It is understood that any of the inventive compositions, for example, immunogenic compositions including a mutant toxin A and/or mutant toxin B, can be combined in different ratios or amounts for therapeutic effect. For example, the mutant *C. difficile* TcdA and mutant *C. difficile* TcdB can be present in a immunogenic composition at a ratio in the range of 0.1:10 to 10:0.1, A:B. In another embodiment, for example, the mutant *C. difficile* TcdB and mutant *C. difficile* TcdA can be present in a immunogenic composition at a ratio in the range of 0.1:10 to 10:0.1, B:A. In one preferred embodiment, the ratio is such that the composition includes a greater total amount of a mutant TcdB than a total amount of mutant TcdA.

In one aspect, an immunogenic composition is capable of binding to a neutralizing antibody or binding fragment thereof. Preferably, the neutralizing antibody or binding fragment thereof is one described herein below. In one exemplary embodiment, an immunogenic composition is capable of binding to an anti-toxin A antibody or binding fragment thereof, wherein the anti-toxin A antibody or binding fragment thereof includes a variable light chain having the amino acid sequence of SEQ ID NO: 36 and a variable heavy chain having the amino acid sequence of SEQ ID NO: 37. For example, the immunogenic composition may include a mutant *C. difficile* TcdA, SEQ ID NO: 4, or SEQ ID NO: 7. As another example, the immunogenic composition may include SEQ ID NO: 84 or SEQ ID NO: 83.

In another exemplary embodiment, an immunogenic composition is capable of binding to an anti-toxin B antibody or binding fragment thereof, wherein the anti-toxin B antibody or binding fragment thereof includes a variable light chain of B8-26 and a variable heavy chain of B8-26. For example, the immunogenic composition may include a mutant *C. difficile* TcdB, SEQ ID NO: 6, or SEQ ID NO: 8. As another example, the immunogenic composition may include SEQ ID NO: 86 or SEQ ID NO: 85.

Recombinant cell

In another aspect, the invention relates to a recombinant cell or progeny thereof. In one embodiment, the cell or progeny thereof includes a polynucleotide encoding a mutant *C. difficile* TcdA and/or a mutant *C. difficile* TcdB.

In another embodiment, the recombinant cell or progeny thereof includes a nucleic acid sequence that encodes a polypeptide having at least about 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, preferably about 98%, more preferably about 99% or most preferably about 100% identity to any of SEQ ID NO: 4, SEQ ID NO: 6, SEQ ID NO: 7, or SEQ ID NO: 8, when optimally aligned, such as by the programs GAP or BESTFIT using default gap weights. In one embodiment, the recombinant cell or progeny thereof includes a nucleic acid sequence that encodes a polypeptide having at least about 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, preferably about 98%, more preferably about 99% or most preferably about 100% identity to any of SEQ ID NOs: 1 through SEQ ID NO: 761.

In another embodiment, the recombinant cell or progeny thereof includes a nucleic acid sequence that encodes a polypeptide having at least about 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, preferably about 98%, more preferably about 99% or most preferably about 100% identity to any of SEQ ID NO: 84, SEQ ID NO: 86, SEQ ID NO: 83, or SEQ ID NO: 85, when optimally aligned, such as by the programs GAP or BESTFIT using default gap weights.

In an additional embodiment, the recombinant cell or progeny thereof includes nucleic acid sequence having at least about 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, preferably about 98%, more preferably about 99% or most preferably about 100% identity to any of SEQ ID NO: 11, SEQ ID NO: 12, SEQ ID NO: 13, SEQ ID NO: 14, SEQ ID NO: 44, SEQ ID NO: 45, SEQ ID NO: 46, or SEQ ID NO: 47, when optimally aligned, such as by the programs GAP or BESTFIT using default gap weights. The recombinant cell may be derived from any cell useful in the recombinant production of a polypeptide of the present invention, e.g., a prokaryote or a eukaryote. Preferably, the recombinant cell is derived from any cell that is suitable for expressing heterologous nucleic acid sequences greater than about 5000, 6000, preferably about 7000, and more preferably about 8000 nucleotides or more. The prokaryotic host cell may be any gram-negative or gram-positive bacterium. In exemplary embodiments, the prokaryotic host cell lacks an endogenous polynucleotide encoding a toxin and/or spore.

Gram-negative bacteria include, but are not limited to, *Campylobacter, E. coli, Flavobacterium, Fusobacterium, Helicobacter, Ilyobacter, Neisseria, Pseudomonas, Salmonella*, and *Ureaplasma.* For example, the recombinant cell may be derived from a *Pseudomonas fluorescens* cell, as described in US Patent application publication 2010013762, paragraphs [0201]-[0230], which is incorporated herein by reference.

Gram-positive bacteria include, but are not limited to, *Bacillus, Clostridium, Enterococcus, Geobacillus, Lactobacillus, Lactococcus, Oceanobacillus, Staphylococcus, Streptococcus*, and *Streptomyces*. Preferably, the cell is derived from a *C. difficile* cell.

The inventors identified strains of wild-type *C. difficile* that lack an endogenous polynucleotide encoding a *C. difficile* toxin. The strains lacking endogenous toxin A and B genes include the following strains, which are available through the American Type Culture Collection (ATCC) (Manassas, VA): *C. difficile* 1351 (ATCC 43593™), *C. difficile* 3232 (ATCC BAA-1801™), *C. difficile* 7322 (ATCC 43601™), *C. difficile* 5036 (ATCC 43603™), *C. difficile* 4811 (ATCC 43602™), and *C. difficile* VPI 11186 (ATCC 700057™).

Accordingly, in one embodiment, the recombinant *C. difficile* cell is derived from a strain described herein. Preferably, the recombinant *C. difficile* cell or progeny thereof is derived from the group consisting of *C. difficile* 1351, *C. difficile* 5036, and *C. difficile* VPI 11186. More preferably, the recombinant *C. difficile* cell or progeny thereof is derived from a *C. difficile* VPI 11186 cell.

In a preferred embodiment, the sporulation gene of the recombinant *C. difficile* cell or progeny thereof is inactivated. Spores may be infective, highly resistant, and facilitate the persistence of *C. difficile* in aerobic environments outside of the host. Spores may also contribute to survival of *C. difficile* inside the host during antimicrobial therapy. Accordingly, a *C. difficile* cell lacking a sporulation gene is useful to produce a safe immunogenic composition for administration to mammals. In addition, use of such cells facilitates safety during manufacturing, e.g., safety to protect the facility, future products, and staff.

Examples of sporulation genes for targeted inactivation include, *inter alia*, *spo0A, spoIIE,* σ^E, σ^G, *and* σ^K. Preferably, the *spo0A* gene is inactivated.

Methods of inactivating a *C. difficile* sporulation gene are known in the art. For example, a sporulation gene may be inactivated by targeted insertion of a selectable

marker, such as, an antibiotic resistance marker. See, for example, Heap et al., *J Microbiol Methods.* 2010 Jan;80(1):49-55; Heap et al., *J. Microbiol. Methods*, 2007 Sept; 70(3):452-464; and Underwood et al., *J Bacteriol.* 2009 Dec;191(23):7296-305. See also, for example, Minton et al., WO2007/148091, entitled, "DNA Molecules and Methods," incorporated herein by reference in its entirety from pages 33-66, or the corresponding US publication US 20110124109 A1, paragraphs [00137]-[0227].

Compositions relating to Culturing a *C. difficile* Cell

The invention further relates to compositions and methods for use in culturing *C. difficile* and producing *C. difficile* toxins. In one aspect, the invention relates to a culture medium comprising a nitrogen source and a *C. difficile* cell.

Suitable culture medium nitrogen sources include: HY-SOY (Quest), AMI-SOY (Quest), NZ-SOY (Quest), NZ-SOY BL4 (Quest), NZ-SOY BL7 (Quest), SHEFTONE D (Sheffield), SE50M (DMV), SE50 (DMV), SE %) MK (DMV), SOY PEPTONE (Gibco), BACTO-SOYTON (Difco), NUTRISOY 2207 (ADM), BAKES NUTRISOY (ADM) NUTRISOY FLOUR, Soybean meal, BACTO-YEAST EXTRACT (Difco) YEAST EXTRACT (Gibco), HY-YEST 412 yeast extract(Quest), HY-YEST 441 yeast extract (Quest), HY-YEST 444 yeast extract (Quest), HY-YEST 455 yeast extract (Quest) BACTO-MALT EXTRACT (Difco), Corn Steep, and PROFLO (Traders).

In one aspect, the invention relates to a culture medium including a vegetable hydrolysate and a *C. difficile* cell. Any vegetable hydrolysate may be suitable. Examples of suitable vegetable hydrolysates are cottonseed hydrolysate, pea hydrolysate, and soy hydrolysate.

In a preferred embodiment, the vegetable hydrolysate is soy hydrolysate. Preferably, the soy hydrolysate is SE50MK (Friesland-Campaigna). Other examples of soy products that may be used in the invention, and their sources, include: Tekniscience: Soy Peptone A1, Soy Peptone A2, Soy Peptone A3, Plant Peptone E1, Plant Peptone ET1, and Wheat Peptone E1; Quest: HY-Soy, HY-Soy T, AMI-Soy, NZ-Soy, NZ-Soy BLA, and NZ-Soy BL7; DMV: SE50M, SE70M, SE50MK, SE50MK-NK (Friesland-Campaigna), WGE80BT, WGE80M, CNE50M, and SE70BT; Marcor: Soy Peptone Type AB, Soy Peptone Type AC, Soy Peptone Type SL, Soy Peptone Type II, and Soy Peptone Type F; Oxoid: Vegetable Peptone and Vegetable Peptone No. 1; Gibco: Soy Peptone; and Difco: Bacsoytone.

Concentrations of the vegetable hydrolysate in the culture medium can range, for example, between a minimal value of 5, 10, 20, 30, 40, or 50 g/L to a maximal value of 200, 150, 100, or 75 g/L. Any minimum value can be combined with any maximum value to define a suitable range. In a preferred embodiment, the concentration of vegetable hydrolysate in the culture medium is between 10-50 g/L, most preferably about 30 g/L. The concentration of vegetable hydrolysate in the culture medium described herein may be based on the total volume of the culture medium.

In another aspect, the invention relates to a culture medium including a yeast extract (e.g., as a nitrogen source) and a *Clostridium difficile* cell. Most preferably, the yeast extract is HY YEST 412 (Kerry Biosciences).

Concentrations of the yeast extract in the culture medium can range, for example, between a minimal value of 5, 10, 20, 30, 40, or 50 g/L to a maximal value of 200, 150, 100, or 75 g/L. Any minimum value can be combined with any maximum value to define a suitable range. In a preferred embodiment, the concentration of yeast extract in the culture medium is between 10-50 g/L, most preferably about 20 g/L. The concentration of yeast extract in the culture medium described herein may be based on the total volume of the culture medium.

The inventors discovered that growth of *C. difficile* can be supported in a culture medium including a vegetable hydrolysate without yeast extract, and in a culture medium that includes yeast extract without a vegetable hydrolysate. The culture of cells and/or production of toxin resulting from a culture medium that includes both a vegetable hydrosylate and yeast extract, however, has been observed to be higher than the yields resulting from a culture medium including a vegetable hydrolysate in the absence of yeast extract, and higher than the yields resulting from a culture medium including yeast extract in the absence of a vegetable hydrolysate.

Accordingly, the inventors discovered that a combination of a vegetable hydrolysate and yeast extract helps to support maximal growth of *C. difficile* and/or production of toxin. In one aspect, the invention relates to a culture medium including a vegetable hydrolysate, yeast extract, and a *C. difficile* cell. The vegetable hydrolysate can be any suitable vegetable hydrolysate known in the art as described above. Preferably, the hydrolysate is soy hydrolysate. More preferably, the soy hydrolysate is SE50MK (Friesland-Campaigna). In a preferred embodiment, the yeast extract is HY YEST 412.

In one embodiment, the medium does not include a carbon source. The inventors observed that culture medium including soy hydrolysate / yeast extract in the absence of a carbon source achieves OD_{600} values of 2-3 and toxin production yields of 10-15 mg/L.

However, a culture medium that includes a carbon source was surprisingly observed to increase the culture of *C. difficile* cells and production of toxin, as compared to a medium in the absence of a carbon source. In addition, the inventors surprisingly

discovered that production of the mutant toxin was not markedly inhibited by culturing the *C. difficile* cell under anaerobic conditions including a carbon source in the presence of a medium including soy hydrolysate. Accordingly, in a preferred embodiment, the medium further includes a carbon source. More preferably, in one embodiment, the culture medium includes a carbon source, wherein the medium further includes a recombinant *C. difficile* cell. Even more preferably, the recombinant *C. difficile* cell includes a constitutive promoter. In a preferred embodiment, the promoter is a *Clostridium sporogenes* feredoxin (*fdx*) promoter. In another preferred embodiment, the recombinant *C. difficile* cell does not include a regulated chromosomal promoter that may be negatively regulated by, for example, glucose repression. In a most preferred embodiment, the C. difficle cell is a recombinant cell or progeny thereof as described above. Any carbon source may be used in the culture medium. Suitable carbon sources include glucose, dextrose, mannitol, fructose, and/or mannose. Preferably, the carbon source in the culture medium is glucose. In a preferred embodiment, the culture medium does not include arabinose, xylose, sucrose, lactose, maltose, glycerol, rhamnose, and/or galactose.

Concentrations of a carbon source (e.g., glucose, mannitol, fructose, and/or mannose) in the culture medium can range, for example, between a minimal value of 1, 5, 10, 15, 20, 30, 40, 50, or 60 g/L to a maximal value of 150, 100, 90, 80, 75, 70, 50, 40, or 30 g/L. Any minimum value can be combined with any maximum value to define a suitable range. In a preferred embodiment, the concentration of a carbon source in the culture medium is between 5-70 g/L. In one embodiment, the concentration of a carbon source in the culture medium is about 10 g/L. In another embodiment, the concentration of a carbon source in the culture medium is greater than 10 g/L. In another embodiment, the concentration of a carbon source (e.g., glucose) in the culture medium is 45-75 g/L, preferably 55-65 g/L more preferably 55-65 g/L. In another embodiment, the concentration of a carbon source in the culture medium is about 60 g/L. The concentration of carbon source in the culture medium described herein may be based on the total volume of the culture medium.

In one embodiment, the culture medium further includes a chloramphenicol derivative. Exemplary chloramphenicol derivatives include any one of thiamphenicol, florfenicol, chloramphenicol succinate, and fluoramphenicol. Preferably, the culture medium includes thiamphenicol. Without being bound by mechanism or theory, the

chloramphenicol derivative is believed to help in preventing plasmid loss during fermentation and in increasing production of cells and/or toxin, as compared to a culture medium in the absence of a chloramphenicol derivative.

Concentrations of a chloramphenicol derivative in the culture medium can range, for example, between a minimal value of 5, 10, 15, 20, or 30 mg/L to a maximal value of 100, 75, 50, or 40 mg/L. In another embodiment, the concentration of chloramphenicol derivative in the culture medium can range, for example between a minimal value of 0.5 g/L, 1 g/L, 1.5 g/L, 2 g/L, 2.5 g/L, 3 g/L, 3.5 g/L, 4 g/L, 4.5 g/L, or 5 g/L to a maximal value of 10 g/L, 9.5 g/L, 9 g/L, 8.5 g/L, 8 g/L, 7.5 g/L, 7 g/L, 6.5 g/L, 6 g/L, 5.5 g/L, 5 g/L. Any minimum value can be combined with any maximum value to define a suitable range. In a preferred embodiment, the concentration of a chloramphenicol derivative in the culture medium is between 5-20 mg/L, most preferably about 15 mg/L. In a another preferred embodiment, the concentration of a chloramphenicol derivative in the culture medium is between 1 g/L-10 g/L, preferably between 1g/L-5 g/L, most preferably about 3 g/L. The concentration of chloramphenicol derivative in the culture medium described herein may be based on the total volume of the culture medium.

In one embodiment, the culture medium further includes a cell protectant, such as polyethylene glycol, a polyvinyl alcohol or a pluronic polyol. In one embodiment, the culture medium includes polyethylene glycol, such as polyethylene glycol 2000 (PPG 2000).

Concentrations of a cell protectant, such as polyethylene glycol, in the culture medium can range, for example, between a minimal value of 0.01, 0.05, 0.10, 0.15, 0.20, 0.25, 0.30, 0.35, 0.40, 0.45, 0.50, 0.55, 0.60, 0.65, 0.70, 0.75, 0.80, 0.85, 0.90, 0.95, or 1 ml/L to a maximal value of 2, 1, 0.90, 0.80, 0.70, 0.60, 0.50, 0.40, 0.30, 0.20 ml/L. Any minimum value can be combined with any maximum value to define a suitable range. In a preferred embodiment, the concentration of a the cell protectant, such as polyethylene glycol in the culture medium is between 0.01 ml/L to 0.0.50, most preferably about 0.25 ml/L. The concentration of cell protectant in the culture medium described herein may be based on the total volume of the culture medium.

In a preferred embodiment, the culture medium includes a vegetable hydrolysate, yeast extract, and a carbon source, wherein the vegetable hydrolysate is soy hydrolysate, wherein the yeast extract is HY YEST 412 (Kerry Biosciences), and wherein the carbon source is glucose, mannitol, fructose, and/or mannose. In a most

preferred embodiment, the culture medium includes soy hydrolysate SE50MK, HY YEST 412 yeast extract, glucose, and thiamphenicol, at pH 7.

In one preferred embodiment, the culture medium includes 30 g/L soy hydrolysate SE50MK, 20 g/L HY YEST 412 yeast extract, 10 g/L glucose, and 15 mg/L thiamphenicol, at pH 7. In one preferred embodiment, the culture medium includes about 30 g/L soy hydrolysate SE50MK, about 20 g/L HY YEST 412 yeast extract, about 10 g/L glucose, and about 15 mg/L thiamphenicol, at pH 7. The culture medium may further include about about 0.25 ml/L PPG 2000. In another embodiment, the culture medium may further include dextrose.

In another preferred embodiment, the culture medium includes 30 g/L soy hydrolysate SE50MK, 20 g/L HY YEST 412 yeast extract, 60 g/L glucose, and 15 mg/L thiamphenicol, at pH 7. In another preferred embodiment, the culture medium includes about 30 g/L soy hydrolysate SE50MK, about 20 g/L HY YEST 412 yeast extract, about 60 g/L glucose, and about 15 mg/L thiamphenicol, at pH 7. The culture medium may further include about about 0.25 ml/L PPG 2000. In another embodiment, the culture medium may further include dextrose.

In one embodiment, the culture medium further includes polypropylene glycol 2000 (PPG 2000). The culture medium may include about 0.05 mL PPG 2000 to about 1 ml PPG 2000/L medium, preferably the culture medium includes about 0.25 ml/L PPG 2000/L medium.

The culture medium described herein may be suitable for culturing any *C. difficile* cell. In one embodiment, the cell is not genetically modified. In another embodiment, the cell is genetically modified, such as a recombinant cell or progreny thereof as described above. In one embodiment, the *C. difficile* cell is lacks an endogenous polynucleotide encoding a toxin. In a preferred embodiment, the *C. difficile* cell is derived from VPI 11186.

In another embodiment, the cell includes a constitutive promoter. In a preferred embodiment, the promoter is a *Clostridium sporogenes* feredoxin (*fdx*) promoter. In another preferred embodiment, the cell does not include a regulated chromosomal promoter that may be negatively regulated by, for example, glucose repression. In a most preferred embodiment, the *C. difficile* cell is a recombinant cell or progeny thereof as described above.

The inventors also discovered that a monoclonal antibody medium supports growth of *C. difficile*. Accordingly, in one aspect, the invention relates to a culture medium that includes a monoclonal antibody medium. In one embodiment, the medium is SFM4MAb™ medium (Thermo Scientific). The medium was shown to give OD_{600} values of about 10 and toxin production yield was about 40 mg/L.

In one embodiment, the pH of the culture medium can range, for example, between a minimal value of 6.0, 6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7, 6.8, 6.9, or 7.0 to a maximal value of 8.0, 7.9, 7.8, 7.7, 7.6, 7.5, 7.4, 7.3, 7.2, or 7.1. Any minimum value can be combined with any maximum value to define a suitable range. In a preferred embodiment, the pH of the culture medium is between 6.0 to 8.0, more preferably, between 6.5 to 7.5. Most preferably, the pH is 7.0.

Suitable pH titrants are known in the art, including, for example, NH_4OH, Na_2CO_3, and NaOH. Preferably, the pH titrant is NaOH.

The culture medium may include phosphate-containing ingredients such as Na_2HPO_4, KH_2PO_4. However, in a preferred embodiment, the culture mediumdoes not include a phosphate-containing ingredient.

Methods relating to Culturing a *C. difficile* Cell

In another aspect, the invention relates to a method of culturing *C. difficile*. The method includes culturing a *C. difficile* cell in a medium as described above.

In one embodiment, growth of *C. difficile* according to the methods of the invention proceeds in at least two phases: seed growth and fermentation. A seed culture is first grown by inoculation from a stock culture, e.g., a working cell bank. The seed is used either to inoculate a second seed culture or to inoculate a relatively large fermentation culture. As is understood in the art, the number of seed cultures used may depend, for example, on the size and volume of the fermentation step.

Accordingly, in one aspect, the invention relates to a method of culturing *C. difficile*. The method includes culturing a *C. difficile* cell in a first culture medium under conditions that facilitate growth of the cell; inoculating a second culture medium with all or a portion of said first medium after said first culturing; culturing said inoculated second medium under conditions that facilitate growth of the cell. The method may further include isolating a *C. difficile* toxin from said second medium. In one embodiment, the *C. difficile* is grown in a first culture medium referred to as a seed culture. In one embodiment, the seed culture includes a culture medium as described above and an inoculation from a stock culture that was grown in the medium.

The seed growth phase (or phases) are generally carried out to scale-up the quantity of the microorganism from a stored culture, so that it can be used as an inoculant for the fermentation phase. The seed growth phase can also be carried out to allow relatively dormant microbes in stored cultures to become rejuvenated and to grow into actively growing cultures.

The volume and quantity of viable cells used to inoculate the fermentation culture can be controlled more accurately if taken from an actively growing culture (e.g., a seed culture), rather than if taken from a stored culture.

In addition, more than one (e.g., two or three) seed growth phases can be used to scale-up the quantity of *C. difficile* for inoculation of the fermentation medium. Alternatively, growth of *C. difficile* in the fermentation phase can proceed directly from the stored culture by direct inoculation, if desired.

The first culture medium includes a culture medium as described above. For example, in one embodiment, the first culture medium includes a vegetable hydrolysate and a *C. difficile* cell. Preferably, the vegetable hydrolysate is soy hydrolysate, most

preferably soy hydrolysate SE50MK. In another embodiment, the first culture medium includes a yeast extract and a *C. difficile* cell. Preferably, the yeast extract is HY YEST 412. In a further embodiment, the first culture medium includes a vegetable hydrolysate and a yeast extract. In yet a further embodiment, the first culture medium further includes a carbon source. Preferably, the carbon source is glucose. In one embodiment, the culture medium includes a recombinant *C. difficile* cell when a carbon source is included, wherein the recombinant cell includes a constitutive promoter. In another embodiment, the first culture medium further includes a chloramphenicol derivative. Preferably, the culture medium includes thiamphenicol.

Concentrations of the vegetable hydrolysate in the first culture medium (e.g., seed culture medium) can range, for example, between a minimal value of 5, 10, 20, 30, 40, or 50 g/L to a maximal value of 200, 150, 100, or 75 g/L. Any minimum value can be combined with any maximum value to define a suitable range. In a preferred embodiment, the concentration of vegetable hydrolysate in the culture medium is between 10-50 g/L, most preferably about 30 g/L. The concentration of vegetable hydrolysate in the culture medium described herein may be based on the total volume of the culture medium.

Concentrations of the yeast extract in the first culture medium (e.g., seed culture medium) can range, for example, between a minimal value of 5, 10, 20, 30, 40, or 50 g/L to a maximal value of 200, 150, 100, or 75 g/L. Any minimum value can be combined with any maximum value to define a suitable range. In a preferred embodiment, the concentration of yeast extract in the culture medium is between 10-50 g/L, most preferably about 20 g/L. The concentration of yeast extract in the culture medium described herein may be based on the total volume of the culture medium.

Concentrations of a carbon source in the first culture medium (e.g., seed culture medium) can range, for example, between a minimal value of 1, 5, 10, 15, or 20 g/L to a maximal value of 100, 75, 50, 40, or 30 g/L. Any minimum value can be combined with any maximum value to define a suitable range. In a preferred embodiment, the concentration of a carbon source in the culture medium is between 5-20 g/L, most preferably about 10 g/L.

In one embodiment, the culture medium further includes a chloramphenicol derivative selected from the group consisting of thiamphenicol, florfenicol, chloramphenicol succinate, and fluoramphenicol. Preferably, the culture medium

includes thiamphenicol. Concentrations of a chloramphenicol derivative in the first culture medium (e.g., seed culture medium) can range, for example, between a minimal value of 5, 10, 15, 20, or 30 mg/L to a maximal value of 100, 75, 50, or 40 mg/L. Any minimum value can be combined with any maximum value to define a suitable range. In a preferred embodiment, the concentration of a chloramphenicol derivative in the culture medium is between 5-20 mg/L, most preferably about 15 mg/L.

In one embodiment, the pH of the first culture medium can range, for example, between a minimal value of 6.0, 6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7, 6.8, 6.9, or 7.0 to a maximal value of 8.0, 7.9, 7.8, 7.7, 7.6, 7.5, 7.4, 7.3, 7.2, or 7.1. Any minimum value can be combined with any maximum value to define a suitable range. In a preferred embodiment, the pH of the first culture medium is between 6.0 to 8.0, more preferably, between 6.5 to 7.5. Most preferably, the pH is 7.0.

In a preferred embodiment, the first culture medium includes soy hydrolysate, yeast extract HY YEST 412, glucose, thiamphenicol, at pH 7. More preferably, the culture medium includes 30 g/L soy hydrolysate SE50MK, 20 g/L yeast extract HY YEST 412, 10 g/L glucose, 15 mg/L thiamphenicol, at pH 7.

To start the fermentation phase, a portion or all of a seed culture containing *C. difficile* may be used to inoculate fermentation culture medium. An appropriate concentration of seed culture to use to inoculate fermentation media can be determined by those of skill in this art and can range, for example, from 0.1-10%. As specific examples, concentrations of 0.5, 1, 5, 5.5, 6, 6.25, 6.5, 7, 8, 9, 10% can be used.

Fermentation may be used to produce the maximum amount of cells in a large-scale anaerobic environment. In one embodiment, the *C. difficile* is grown as a fermentation culture. In one embodiment, the fermentation culture was inoculated from a seed culture that was grown in the medium.

The second culture medium includes a culture medium as described above. For example, in one embodiment, the second culture medium includes a vegetable hydrolysate and a *C. difficile* cell. Preferably, the vegetable hydrolysate is soy hydrolysate, most preferably soy hydrolysate SE50MK. In another embodiment, the second culture medium includes a yeast extract and a *C. difficile* cell. Preferably, the yeast extract is HY YEST 412. In a further embodiment, the second culture medium includes a vegetable hydrolysate and a yeast extract. In yet a further embodiment, the second culture medium further includes a carbon source. Preferably, the carbon source

is glucose. In one embodiment, the culture medium includes a recombinant *C. difficile* cell when a carbon source is included, wherein the recombinant cell includes a constitutive promoter. In another embodiment, the second culture medium further includes a chloramphenicol derivative. Preferably, the culture medium includes thiamphenicol.

Concentrations of the vegetable hydrolysate in the second culture medium can range, for example, between a minimal value of 5, 10, 20, 30, 40, or 50 g/L to a maximal value of 200, 150, 100, or 75 g/L. Any minimum value can be combined with any maximum value to define a suitable range. In a preferred embodiment, the concentration of vegetable hydrolysate in the culture medium is between 10-50 g/L, most preferably about 30 g/L. The concentration of vegetable hydrolysate in the culture medium described herein may be based on the total volume of the culture medium.

Concentrations of the yeast extract in the second culture medium can range, for example, between a minimal value of 5, 10, 20, 30, 40, or 50 g/L to a maximal value of 200, 150, 100, or 75 g/L. Any minimum value can be combined with any maximum value to define a suitable range. In a preferred embodiment, the concentration of yeast extract in the culture medium is between 10-50 g/L, most preferably about 20 g/L.

Concentrations of a carbon source in the second culture medium can range, for example, between a minimal value of 10, 20, 30, 40, 50, or 60 g/L to a maximal value of 150, 100, 90, 80, or 70 g/L. Any minimum value can be combined with any maximum value to define a suitable range. In a preferred embodiment, the concentration of a carbon source in the culture medium is between 50-70 g/L, most preferably about 60 g/L. In one embodiment, the concentration of a carbon source in the second culture medium is greater than the concentration of the carbon source in the first culture medium. The concentration of carbon source in the culture medium described herein may be based on the total volume of the culture medium.

In one embodiment, the culture medium further includes a chloramphenicol derivative selected from the group consisting of thiamphenicol, florfenicol, chloramphenicol succinate, and fluoramphenicol. Preferably, the culture medium includes thiamphenicol. Concentrations of a chloramphenicol derivative in the second culture medium can range, for example, between a minimal value of 5, 10, 15, 20, or 30 mg/L to a maximal value of 100, 75, 50, or 40 mg/L. In another embodiment, the concentration of chloramphenicol derivative in the culture medium can range, for

example between a minimal value of 0.5 g/L, 1 g/L, 1.5 g/L, 2 g/L, 2.5 g/L, 3 g/L, 3.5 g/L, 4 g/L, 4.5 g/L, or 5 g/L to a maximal value of 10 g/L, 9.5 g/L, 9 g/L, 8.5 g/L, 8 g/L, 7.5 g/L, 7 g/L, 6.5 g/L, 6 g/L, 5.5 g/L, 5 g/L. Any minimum value can be combined with any maximum value to define a suitable range. In a preferred embodiment, the concentration of a chloramphenicol derivative in the culture medium is between 5-20 mg/L, most preferably about 15 mg/L. In a another preferred embodiment, the concentration of a chloramphenicol derivative in the culture medium is between 1 g/L-10 g/L, preferably between 1g/L-5 g/L, most preferably about 3 g/L. The concentration of chloramphenicol derivative in the culture medium described herein may be based on the total volume of the culture medium.

In one embodiment, the culture medium further includes a cell protectant, such as polyethylene glycol, a polyvinyl alcohol or a pluronic polyol. In one embodiment, the culture medium includes polyethylene glycol, such as polyethylene glycol 2000 (PPG 2000).

Concentrations of a cell protectant, such as polyethylene glycol, in the culture medium can range, for example, between a minimal value of 0.01, 0.05, 0.10, 0.15, 0.20, 0.25, 0.30, 0.35, 0.40, 0.45, 0.50, 0.55, 0.60, 0.65, 0.70, 0.75, 0.80, 0.85, 0.90, 0.95, or 1 ml/L to a maximal value of 2, 1, 0.90, 0.80, 0.70, 0.60, 0.50, 0.40, 0.30, 0.20 ml/L. Any minimum value can be combined with any maximum value to define a suitable range. In a preferred embodiment, the concentration of a the cell protectant, such as polyethylene glycol in the culture medium is between 0.01 ml/L to 0.0.50, most preferably about 0.25 ml/L. The concentration of cell protectant in the culture medium described herein may be based on the total volume of the culture medium.

In one embodiment, the pH of the second culture medium can range, for example, between a minimal value of 6.0, 6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7, 6.8, 6.9, or 7.0 to a maximal value of 8.0, 7.9, 7.8, 7.7, 7.6, 7.5, 7.4, 7.3, 7.2, or 7.1. Any minimum value can be combined with any maximum value to define a suitable range. In a preferred embodiment, the pH of the second culture medium is between 6.0 to 8.0, more preferably, between 6.5 to 7.5. Most preferably, the pH is 7.0.

In a preferred embodiment, the second culture medium includes soy hydrolysate, yeast extract HY YEST 412, glucose, thiamphenicol, at pH 7. More preferably, the culture medium includes 30 g/L soy hydrolysate, 20 g/L yeast extract HY YEST 412, 60 g/L glucose, 15 mg/L thiamphenicol, at pH 7.

In one embodiment, the culturing is carried out under anaerobic conditions. In one embodiment, the culturing steps of the methods of the invention (both seed and fermentation) are carried out under anaerobic conditions, although aerobic conditions for either of these phases may be used as well.

Approaches to anaerobic culture of bacteria, such as *C. difficile*, are known in the art and can employ, for example, nitrogen gas or a mixture of nitrogen and hydrogen gases. The gas may be bubbled through the medium (e.g., sparging) during fermentation or passed through the area above the liquid in a culture chamber (e.g., the chamber headspace).

Culturing of the *C. difficile* cell can be carried out in an anaerobic chamber at approximately 30±1° C, 31±1° C, 32±1° C, 33±1° C, 34±1° C, 35±1° C, 36±1° C, 37±1° C, 38±1° C, or 39±1° C, preferably about 37±1° C. The culturing can be carried out for times ranging, for example, between a minimal value of 1, 2, 3, 4, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, or 24 hours to a maximal value of 9 days, 8 days, 7 days, 6, days, 5 days, 4 days, 3 days, 48 hours, or 36 hours, or 24 hours. Any minimum value can be combined with any maximum value to define a suitable range. In a preferred embodiment, the culturing of the cell occurs for 11 to 48 hours, most preferably about 24 hours. In another embodiment, the culturing of the cell occurs for 5 to 25 hours, 10 to 20 hours, preferably about 15 hours. Growth can be monitored by measuring the optical density (O.D.) of the medium.

In one embodiment, the method further includes isolating *C. difficile* toxins from said medium. *C. difficile* toxins can be isolated and/or purified from cultures using known protein purification methods. The purified toxins can then, for example, be inactivated by chemically inactivation treatment.

In an alternative aspect, the invention relates to a method of culturing *C. difficile*. The method includes culturing a *C. difficile* cell in a monoclonal antibody medium.

In another aspect, the invention relates to a method for production of a *C. difficile* toxin. The method includes culturing a *C. difficile* bacterium in a medium, as described above, under conditions to permit production of the toxin. The method further includes isolating the *C. difficile* toxin from the medium.

In one embodiment, the method includes culturing a *C. difficile* cell in a first medium under conditions that facilitate growth of *C. difficile*; inoculating a second medium with all or a portion of said first medium after said culturing; culturing said

inoculated second medium under conditions that facilitate growth of *C. difficile* and toxin production; and isolating a *C. difficile* toxin from said second medium. In one embodiment, culturing of the first or second media including *C. difficile* is carried out under anaerobic conditions.

In one embodiment, the *C. difficile* cell is cultured in a continuous culture system. In another embodiment, the invention relates to a method of culturing *C. difficile* in a perfusion culture. Surprisingly, the inventors discovered that a recombinant *C. difficile* cell expressing a mutant toxin may be successfully cultured in an anaerobic continous culture and in an anaerobic perfusion culture. An advantage of a continuous system and/or a perfusion system is that fresh media may be added continuously. In addition, toxin byproducts from production may be removed during production while maintaining cell viability in the system.

The continuous culture system may include providing fresh medium to the cells while simultaneously removing spent medium and cells from the bioreactor. The continuous culture may include a perfusion culture, in which the liquid outflow contains culture medium that is substantially free of cells or includes a substantially lower cell concentration than that in the bioreactor. In a perfusion culture, cells can be retained by, for example, filtration, ultrasonic filtration, centrifugation, or sedimentation.

In one embodiment, the spent media is removed and filtered, which prevents cells from being removed from the bioreactor. The filter may be a cross-flow filter and/or a tangential flow filter. In one embodiment, said filtration system comprises a hollow fiber filter. In another embodiment, the cells are prevented from being removed from the bioreactor by a centrifugation step. In another embodiment, the cells are prevented from being removed from the bioreactor by an ultrasonic filtration step. In another embodiment, the cells arc prevented from being removed from the bioreactor via a sedimentation system. In another embodiment, said filtration system comprises a flat-sheet cassette.

In yet another embodiment, the perfusion system comprises a hollow fiber filter that will retain cells, but not the desired product. The cells are recycled back into the bioreactor and the spent media containing the desired product is passed through a desired molecular weight cut-off filter. The filter will retain the desired product. Waste products not retained by the filter can be disposed or recycled.

Method of Producing a Mutant *C. difficile* Toxin

In one aspect, the invention relates to a method of producing a mutant *C. difficile* toxin. In one embodiment, the method includes culturing any recombinant cell or progeny thereof described above, under suitable conditions to express a polypeptide. The method further includes a step of isolating the toxin from the medium.

In another embodiment, the method includes culturing a recombinant cell or progeny thereof under suitable conditions to express a polynucleotide encoding a mutant *C. difficile* toxin, wherein the cell includes the polynucleotide encoding the mutant *C. difficile* toxin, and wherein the mutant includes a glucosyltransferase domain having at least one mutation and a cysteine protease domain having at least one mutation, relative to the corresponding wild-type *Clostridium difficile* toxin. In one embodiment, the cell lacks an endogenous polynucleotide encoding a toxin.

In a further embodiment, the method includes culturing a recombinant *C. difficile* cell or progeny thereof under suitable conditions to express a polynucleotide encoding a mutant *C. difficile* toxin, wherein the cell includes the polynucleotide encoding the mutant *C. difficile* toxin and the cell lacks an endogenous polynucleotide encoding a *C. difficile* toxin.

In another aspect, the invention relates to a method of producing a mutant *C. difficile* toxin. The method includes the steps of: (a) contacting a *C. difficile* cell with a recombinant *Escherichia coli* cell, wherein the *C. difficile* cell lacks an endogenous polynucleotide encoding a *C. difficile* toxin and the *E. coli* cell includes a polynucleotide that encodes a mutant *C. difficile* toxin; (b) culturing the *C. difficile* cell and the *E. coli* cell under suitable conditions for transfer of the polynucleotide from the *E. coli* cell to the *C. difficile* cell; (c) selecting the *C. difficile* cell comprising the polynucleotide encoding the mutant *C. difficile* toxin; (d) culturing the *C. difficile* cell of step (c) under suitable conditions to express the polynucleotide; and (e) isolating the mutant *C. difficile* toxin.

In the inventive method, the recombinant *E. coli* cell includes a heterologous polynucleotide that encodes the mutant *C. difficile* toxin, described herein. The polynucleotide may be DNA or RNA. In one exemplary embodiment, the polynucleotide that encodes the mutant *C. difficile* toxin is codon-optimized for *E. coli* codon usage. Methods for codon-optimizing a polynucleotide are known in the art.

In one embodiment, the polynucleotide includes a nucleic acid sequence that is at least about 60%, 65%, 70%, 75%, 80%, 85%, 86%, 87%, 88%, 89%, 90%, 91%,

92%, 93%, 94%, 95%, 96%, 97%, 98%, 99%, or 100% identical to a polynucleotide encoding a mutant *C. difficile* TcdA, as described above. In one embodiment, the polynucleotide includes a nucleic acid sequence that is at least about 60%, 65%, 70%, 75%, 80%, 85%, 86%, 87%, 88%, 89%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, 99%, or 100% identical to a polynucleotide encoding a polypeptide having any one sequence selected from SEQ ID NO: 1 to SEQ ID NO: 761. An exemplary polynucleotide encoding a mutant *C. difficile* toxin A includes SEQ ID NO: 11, SEQ ID NO: 12, SEQ ID NO: 44, and SEQ ID NO: 45.

In another embodiment, the polynucleotide includes a nucleic acid sequence that is at least about 60%, 65%, 70%, 75%, 80%, 85%, 86%, 87%, 88%, 89%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, 99%, or 100% identical to a polynucleotide encoding a mutant *C. difficile* TcdB, as described above. An exemplary polynucleotide encoding a mutant *C. difficile* toxin B includes SEQ ID NO: 13, SEQ ID NO: 14, SEQ ID NO: 46, and SEQ ID NO: 47. In another embodiment, the polynucleotide encodes SEQ ID NO: 83, SEQ ID NO: 84, SEQ ID NO: 85, or SEQ ID NO: 86.

In one embodiment, the *E. coli* cell that includes the heterologous polynucleotide is an *E. coli* cell that stably hosts the heterologous polynucleotide, which encodes the mutant *C. difficile* toxin. Exemplary *E. coli* cells include a cell selected from the group consisting of MAX Efficiency® Stbl2™ *E. coli* Competent Cells (Invitrogen, Carlsbad, CA), One Shot® Stbl3™ Chemically Competent*E. coli* (Invitrogen, Carlsbad, CA), ElectroMAX™ Stbl4™ *E. coli* Competent Cells (Invitrogen , and *E. coli* CA434. In a preferred embodiment, the *E. coli* cloning host cell is not DH5α. More preferably, the *E. coli* cloning host cell is a MAX Efficiency® Stbl2™ *E. coli* Competent Cell.

The inventive method further includes a step of culturing the *C. difficile* cell and the *E. coli* cell under suitable conditions for transfer of the polynucleotide from the *E. coli* cell to the *C. difficile* cell, resulting in a recombinant *C. difficile* cell. In a preferred embodiment, the culture conditions are suitable for transfer of the polynucleotide from the *E. coli* cell (the donor cell) into the *C. difficile* cell (the recipient cell), and resulting in a genetically stable inheritance.

Most preferably, the culture conditions are suitable for bacterial conjugation, which are known in the art. "Conjugation" refers to a particular process of transferring a polynucleotide in which a unidirectional transfer of a polynucleotide (e.g., from a bacterial plasmid) occurs from one bacterium cell (i.e., the "donor") to another (i.e., the

"recipient"). The conjugation process involves donor cell-to-recipient cell contact. Preferably, the donor *E. coli* cell is an *E. coli* CA434 cell.

Exemplary suitable (conjugation) conditions for transferring of the polynucleotide from the *E. coli* cell to the *C. difficile* cell include growing liquid cultures of *C. difficile* in brain heart infusion broth (BHI; Oxoid) or Schaedlers anaerobic broth (SAB; Oxoid). In another embodiment, solid *C. difficile* cultures may be grown on fresh blood agar (FBA) or BHI agar. Preferably, the *C. difficile* is grown at 37°C in an anaerobic environment (e.g., 80% N_2, 10% CO_2, and 10% H_2 [vol/vol]). In one embodiment, the suitable condition includes growing the *E. coli* aerobically in Luria-Bertani (LB) broth or on LB agar at 37°C. For conjugative transfer to *C. difficile*, an exemplary suitable condition includes growing *E. coli* anaerobically on FBA. Antibiotics may be included in the liquid and solid media as is known in the art. Examples of such antibiotics include cycloserine (250 µg/ml), cefoxitin (8 µg/ml), chloramphenicol (12.5 µg/ml), thiamphenicol (15 µg/ml), and erythromycin (5 µg/ml).

The inventive method additionally includes a step of selecting the resulting recombinant *C. difficile* cell that includes the polynucleotide encoding the mutant *C. difficile* toxin. In an exemplary embodiment, the recombinant *C. difficile* cell is a recipient of the polynucleotide encoding the mutant *C. difficile* toxin from the recombinant *E. coli* cell via conjugation.

The inventive method includes a step of culturing the recombinant cell or progeny thereof under suitable conditions to express the polynucleotide encoding the mutant *C. difficile* toxin, resulting in production of a mutant *C. difficile* toxin. Suitable conditions for a recombinant cell to express the polynucleotide include culture conditions suitable for growing a *C. difficile* cell, which are known in the art. For example, suitable conditions may include culturing the *C. difficile* transformants in brain heart infusion broth (BHI; Oxoid) or Schaedlers anaerobic broth (SAB; Oxoid). In another embodiment, solid *C. difficile* cultures may be grown on FBA or BHI agar. Preferably, the *C. difficile* is grown at 37°C in an anaerobic environment (e.g., 80% N_2, 10% CO_2, and 10% H_2 [vol/vol]).

In one embodiment, the inventive method includes a step of isolating the resulting mutant *C. difficile* toxin. Methods of isolating a protein from *C. difficile* are known in the art.

In another embodiment, the method includes a step of purifying the resulting mutant *C. difficile* toxin. Methods of purifying a polypeptide, such as chromatography, are known in the art.

In an exemplary embodiment, the method further includes a step of contacting the isolated mutant *Clostridium difficile* toxin with a chemical crosslinking agent described above. Preferably, the agent includes formaldehyde, ethyl- 3-(3-dimethylaminopropyl) carbodiimide, or a combination of EDC and NHS. Exemplary reaction conditions are described above and in the Examples section below.

In another aspect, the invention relates to an immunogenic composition including a mutant *C. difficile* toxin described herein, produced by any method, preferably by any of the methods described above.

Antibodies

Surprisingly, the inventive immunogenic compositions described above elicited novel antibodies *in vivo*, suggesting that the immunogenic compositions include a preserved native structure (e.g., a preserved antigenic epitope) of the respective wild-type *C. difficile* toxin and that the immunogenic compositions include an epitope. The antibodies produced against a toxin from one strain of *C. difficile* may be capable of binding to a corresponding toxin produced by another strain of *C. difficile*. That is, the antibodies and binding fragments thereof may by "cross-reactive," which refers to the ability to react with similar antigenic sites on toxins produced from multiple *C. difficile* strains. Cross-reactivity also includes the ability of an antibody to react with or bind an antigen that did not stimulate its production, i.e., the reaction between an antigen and an antibody that was generated against a different but similar antigen.

In one aspect, the inventors surprisingly discovered monoclonal antibodies having a neutralizing effect on *C. difficile* toxins, and methods of producing the same. The inventive antibodies can neutralize *C. difficile* toxin cytotoxicity *in vitro*, inhibit binding of *C. difficile* toxin to mammalian cells, and/or can neutralize *C. difficile* toxin enterotoxicity *in vivo*. The present invention also relates to isolated polynucleotides that include nucleic acid sequences encoding any of the foregoing. In addition, the present invention relates to use of any of the foregoing compositions to treat, prevent, decrease the risk of, decrease severity of, decrease occurrences of, and/or delay the outset of a *C. difficile* infection, *C. difficile* associated disease, syndrome, condition, symptom, and/or complication thereof in a mammal, as compared to a mammal to which the composition is not administered, as well as methods for preparing said compositions.

The inventors further discovered that a combination of at least two of the neutralizing monoclonal antibodies can exhibit an unexpectedly synergistic effect in respective neutralization of TcdA or TcdB. Anti-toxin antibodies or binding fragments thereof can be useful in the inhibition of a *C. difficile* infection.

An "antibody" is a protein including at least one or two heavy (H) chain variable regions (abbreviated herein as VH), and at least one or two light (L) chain variable regions (abbreviated herein as VL). The VH and VL regions can be further subdivided into regions of hypervariability, termed "complementarity determining regions" ("CDR"), interspersed with regions that are more conserved, termed "framework regions" (FR). The extent of the framework region and CDRs has been precisely defined (see, Kabat,

E. A., et al. *Sequences of Proteins of Immunological Interest* , Fifth Edition, U.S. Department of Health and Human Services, NIH Publication No. 91-3242, 1991, and Chothia, C. et al., *J. Mol. Biol.* 196:901-917, 1987). The term "antibody" includes intact immunoglobulins of types IgA, IgG, IgE, IgD, IgM (as well as subtypes thereof), wherein the light chains of the immunoglobulin may be of types kappa or lambda.

The antibody molecules can be full-length (e.g., an IgG1 or IgG4 antibody). The antibodies can be of the various isotypes, including: IgG (e.g., IgG1, IgG2, IgG3, IgG4), IgM, IgA1, IgA2, IgD, or IgE. In one preferred embodiment, the antibody is an IgG isotype, e.g., IgG1. In another preferred embodiment, the antibody is an IgE antibody.

In another embodiment, the antibody molecule includes an "antigen-binding fragment" or "binding fragment," as used herein, which refers to a portion of an antibody that specifically binds to a toxin of *C. difficile* (e.g., toxin A). The binding fragment is, for example, a molecule in which one or more immunoglobulin chains is not full length, but which specifically binds to a toxin.

Examples of binding portions encompassed within the term "binding fragment" of an antibody include (i) a Fab fragment, a monovalent fragment consisting of the VL, VH, CL and CH1 domains; (ii) a $F(ab')_2$ fragment, a bivalent fragment comprising two Fab fragments linked by a disulfide bridge at the hinge region; (iii) a Fd fragment consisting of the VH and CH1 domains; (iv) a Fv fragment consisting of the VL and VH domains of a single arm of an antibody, (v) a dAb fragment (Ward et al., *Nature* 341:544-546, 1989), which consists of a VH domain; and (vi) an isolated complementarity determining region (CDR) having sufficient framework to specifically bind, e.g., an antigen binding portion of a variable region.

A binding fragment of a light chain variable region and a binding fragment of a heavy chain variable region, e.g., the two domains of the Fv fragment, VL and VH, can be joined, using recombinant methods, by a synthetic linker that enables them to be made as a single protein chain in which the VL and VH regions pair to form monovalent molecules (known as single chain Fv (scFv); see e.g., Bird et al. (1988) *Science* 242:423-426; and Huston et al. (1988) *Proc. Natl. Acad. Sci. USA* 85:5879-5883). Such single chain antibodies are also encompassed within the term "binding fragment" of an antibody. These antibody portions are obtained using techniques known in the art, and the portions are screened for utility in the same manner as are intact antibodies.

As used herein, an antibody that "specifically binds" to or is "specific" for a particular polypeptide or an epitope on a particular polypeptide is an antibody that binds to that particular polypeptide or epitope on a particular polypeptide without substantially binding to any other polypeptide or polypeptide epitope. For example, when referring to a biomolecule (e.g., protein, nucleic acid, antibody, etc.) that "specifically binds" to a target, the biomolecule binds to its target molecule and does not bind in a significant amount to other molecules in a heterogeneous population of molecules that include the target, as measured under designated conditions (e.g. immunoassay conditions in the case of an antibody). The binding reaction between the antibody and its target is determinative of the presence of the target in the heterogeneous population of molecules. For example, "specific binding" or "specifically binds" refers to the ability of an antibody or binding fragment thereof to bind to a wild-type and/or mutant toxin of *C. difficile* with an affinity that is at least two-fold greater than its affinity for a non-specific antigen.

In an exemplary embodiment, the antibody is a chimeric antibody. A chimeric antibody can be produced by recombinant DNA techniques known in the art. For example, a gene encoding the Fc constant region of a murine (or other species) monoclonal antibody molecule can be digested with restriction enzymes to remove the region encoding the murine Fc, and the equivalent portion of a gene encoding a human Fc constant region is substituted. A chimeric antibody can also be created by recombinant DNA techniques where DNA encoding murine variable regions can be ligated to DNA encoding the human constant regions.

In another exemplary embodiment, the antibody or binding fragment thereof is humanized by methods known in the art. For example, once murine antibodies are obtained, a CDR of the antibody may be replaced with at least a portion of a human CDR. Humanized antibodies can also be generated by replacing sequences of the murine Fv variable region that are not directly involved in antigen binding with equivalent sequences from human Fv variable regions. General methods for generating humanized antibodies are known in the art.

For example, monoclonal antibodies directed toward *C. difficile* TcdA or *C. difficile* TcdB can also be produced by standard techniques, such as a hybridoma technique (see, e.g., Kohler and Milstein, 1975, *Nature*, 256: 495-497). Briefly, an immortal cell line is fused to a lymphocyte from a mammal immunized with *C. difficile*

TcdA, *C. difficile* TcdB, or a mutant *C. difficile* toxin described herein, and the culture supernatants of the resulting hybridoma cells are screened to identify a hybridoma producing a monoclonal antibody that binds to *C. difficile* TcdA or *C. difficile* TcdB. Typically, the immortal cell line is derived from the same mammalian species as the lymphocytes. Hybridoma cells producing a monoclonal antibody of the invention are detected by screening the hybridoma culture supernatants for antibodies that bind *C. difficile* TcdA or *C. difficile* TcdB using an assay, such as ELISA. Human hybridomas can be prepared in a similar way.

As an alternative to producing antibodies by immunization and selection, antibodies of the invention may also be identified by screening a recombinant combinatorial immunoglobulin library with a *C. difficile* TcdA, *C. difficile* TcdB, or a mutant *C. difficile* toxin described herein. The recombinant antibody library may be an scFv library or an Fab library, for example. Moreover, the inventive antibodies described herein may be used in competitive binding studies to identify additional anti-TcdA or anti-TcdB antibodies and binding fragments thereof. For example, additional anti-TcdA or anti-TcdB antibodies and binding fragments thereof may be identified by screening a human antibody library and identifying molecules within the library that competes with the inventive antibodies described herein in a competitive binding assay.

In addition, antibodies encompassed by the present invention include recombinant antibodies that may be generated by using phage display methods known in the art. In phage display methods, phage can be used to display antigen binding domains expressed from a repertoire or antibody library (e.g., human or murine). Phage expressing an antigen binding domain that binds to an immunogen described herein (e.g., a mutant *C. difficile* toxin) can be selected or identified with antigen, e.g., using labeled antigen.

Also within the scope of the invention are antibodies and binding fragments thereof in which specific amino acids have been substituted, deleted, or added. In particular, preferred antibodies have amino acid substitutions in the framework region, such as to improve binding to the antigen. For example, a selected, small number of acceptor framework residues of the immunoglobulin chain can be replaced by the corresponding donor amino acids. Preferred locations of the substitutions include amino acid residues adjacent to the CDR, or which are capable of interacting with a CDR. Criteria for selecting amino acids from the donor are described in U.S. Pat. No.

5,585,089 (e.g., columns 12-16). The acceptor framework can be a mature human antibody framework sequence or a consensus sequence.

As used herein, a "neutralizing antibody or binding fragment thereof" refers to a respective antibody or binding fragment thereof that binds to a pathogen (e.g., a *C. difficile* TcdA or TcdB) and reduces the infectivity and/or an activity of the pathogen (e.g., reduces cytotoxicity) in a mammal and/or in cell culture, as compared to the pathogen under identical conditions in the absence of the neutralizing antibody or binding fragment thereof. In one embodiment, the neutralizing antibody or binding fragment thereof is capable of neutralizing at least about 70%, 75%, 80%, 85%, 90%, 95%, 99%, or more of a biological activity of the pathogen, as compared to the biological activity of the pathogen under identical conditions in the absence of the neutralizing antibody or binding fragment thereof.

As used herein, the term "anti-toxin antibody or binding fragment thereof" refers to an antibody or binding fragment thereof that binds to the respective *C. difficile* toxin (e.g., a *C. difficile* toxin A or toxin B). For example, an anti-toxin A antibody or binding fragment thereof refers to an antibody or binding fragment thereof that binds to TcdA.

The antibodies or binding fragments thereof described herein may be raised in any mammal, wild-type and/or transgenic, including, for example, mice, humans, rabbits, and goats.

When an immunogenic composition described above is one that has been previously administered to a population, such as for vaccination, the antibody response generated in the subjects can be used to neutralize toxins from the same strain and from a strain that did not stimulate production of the antibody. See, for example, Example 37, which shows studies relating to cross-reactivity, generated by the immunogenic composition, between the 630 strain and toxins from various wild-type *C. difficile* strains.

In one aspect, the invention relates to an antibody or binding fragment thereof specific to *C. difficile* TcdA. Monoclonal antibodies that specifically bind to TcdA include A65-33; A60-22; A80-29 and/or, preferably, A3-25.

In one aspect, the invention relates to an antibody or binding fragment thereof specific to a TcdA from any wild type *C. difficile* strain, such as those described above, e.g., to SEQ ID NO: 1. In another aspect, the invention relates to an antibody or binding fragment thereof specific to an immunogenic composition described above. For

example, in one embodiment, the antibody or binding fragment thereof is specific to an immunogenic composition that includes SEQ ID NO: 4 or SEQ ID NO: 7. In another embodiment, the antibody or binding fragment thereof is specific to an immunogenic composition that includes SEQ ID NO: 4 or SEQ ID NO: 7, wherein at least one amino acid of SEQ ID NO: 4 or SEQ ID NO: 7 is crosslinked by formaldehyde, EDC, NHS, or a combination of EDC and NHS. In another embodiment, the antibody or binding fragment thereof is specific to an immunogenic composition that includes SEQ ID NO: 84 or SEQ ID NO: 83.

Antibodies or binding fragments thereof having a variable heavy chain and variable light chain regions that are at least about 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, preferably about 98%, more preferably about 99% or most preferably about 100% identity to the variable heavy and light chain regions of A65-33; A60-22; A80-29 and/or, preferably, A3-25 can also bind to TcdA.

In one embodiment, the antibody or antigen binding fragment thereof includes a variable heavy chain region including an amino acid sequence at least about 60%, 65%, 70%, 75%, 80%, 85%, 86%, 87%, 88%, 89%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, 99%, or 100% identical to a variable heavy chain region amino acid sequence of A3-25 as set forth in SEQ ID NO: 37.

In another embodiment, the antibody or antigen binding fragment thereof includes a variable light chain region including an amino acid sequence at least about 60%, 65%, 70%, 75%, 80%, 85%, 86%, 87%, 88%, 89%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, 99%, or 100% identical to a variable light chain region amino acid sequence of A3-25 as set forth in SEQ ID NO: 36.

In yet a further aspect, the antibody or antigen binding fragment thereof includes a variable heavy chain region including an amino acid sequence at least about 60%, 65%, 70%, 75%, 80%, 85%, 86%, 87%, 88%, 89%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, 99%, or 100% identical to a variable heavy chain region amino acid sequence set forth in SEQ ID NO: 37, and a variable light chain region including an amino acid sequence at least about 60%, 65%, 70%, 75%, 80%, 85%, 86%, 87%, 88%, 89%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, 99%, or 100% identical to a variable light chain region amino acid sequence set forth in SEQ ID NO: 36.

In another embodiment, antibodies or binding fragments thereof having complementarity determining regions (CDRs) of variable heavy chains and/or variable

light chains of A65-33; A60-22; A80-29 and/or, preferably, A3-25 can also bind to TcdA. The CDRs of the variable heavy chain region of A3-25 are shown in Table 4, below.

Table 4: Variable Heavy Chain CDR Amino Acid Sequences

Clone	Chain	CDR	Amino Acid Sequence	SEQ ID NO:
A3-25	Heavy	CDR1	GFTFTNYWMN	41
		CDR2	EIRLKSHNYATHFAESVKG	42
		CDR3	DYYGNPAFVY	43

The CDRs of the variable light chain region of A3-25 are shown in Table 5, below.

Table 5: Variable Light Chain CDR Amino Acid Sequences

Clone	Chain	CDR	Amino Acid Sequence	SEQ ID NO:
A3-25	Light	CDR1	RSSQSLIHSNGNTYLH	38
		CDR2	KVSNRFS	39
		CDR3	SQTTYFPYT	40

In one embodiment, the antibody or binding fragment thereof includes amino acid sequences of the heavy chain complementarity determining regions (CDRs) as shown in SEQ ID NOs: 41 (CDR H1), 42 (CDR H2) and 43 (CDR H3), and/or the amino acid sequences of the light chain CDRs as shown in SEQ ID NOs: 38 (CDR L1), 39 (CDR L2) and 40 (CDR L3).

In one exemplary embodiment, the antibody or binding fragment thereof specific to *C. difficile* toxin A specifically binds to an epitope within the N-terminal region of TcdA e.g., an epitope between amino acids 1-1256 of a TcdA, according to the numbering of SEQ ID NO: 1.

In a preferred embodiment, the antibody or binding fragment thereof specific to *C. difficile* toxin A specifically binds to an epitope within the C-terminal region of toxin A, e.g., an epitope between amino acids 1832 to 2710 of a TcdA, according to the numbering of SEQ ID NO: 1. Examples include A3-25; A65-33; A60-22; A80-29.

In yet another embodiment, the antibody or binding fragment thereof specific to *C. difficile* toxin A specifically binds to an epitope within the “translocation” region of *C. difficile* toxin A, e.g., an epitope that preferably includes residues 956-1128 of a TcdA,

according to the numbering of SEQ ID NO: 1, such as an epitope between amino acids 659-1832 of a TcdA, according to the numbering of SEQ ID NO: 1.

In another aspect, the invention relates to an antibody or binding fragment thereof specific to *C. difficile* TcdB. For example, the antibody or binding fragment thereof may be specific to a TcdB from any wild type *C. difficile* strain, such as those described above, e.g., to SEQ ID NO: 2. In another aspect, the invention relates to an antibody or binding fragment thereof specific to an immunogenic composition described above. For example, in one embodiment, the antibody or binding fragment thereof is specific to an immunogenic composition that includes SEQ ID NO: 6 or SEQ ID NO: 8.

In another embodiment, the antibody or binding fragment thereof is specific to an immunogenic composition that includes SEQ ID NO: 6 or SEQ ID NO: 8, wherein at least one amino acid of SEQ ID NO: 6 or SEQ ID NO: 8 is crosslinked by formaldehyde, EDC, NHS, or a combination of EDC and NHS. In another embodiment, the antibody or binding fragment thereof is specific to an immunogenic composition that includes SEQ ID NO: 86 or SEQ ID NO: 85.

Monoclonal antibodies that specifically bind to TcdB include antibodies produced by the B2-31; B5-40, B70-2; B6-30; B9-30; B59-3; B60-2; B56-6; and/or, preferably, B8-26 clones described herein.

Antibodies or binding fragments thereof that can also bind to TcdB include those having a variable heavy chain and variable light chain regions that are at least about 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, preferably about 98%, more preferably about 99% or most preferably about 100% identity to the variable heavy and light chain regions of B2-31; B5-40, B70-2; B6-30; B9-30; B59-3; B60-2; B56-6, preferably B8-26, B59-3, and/or B9-30.

In one embodiment, the antibody or antigen binding fragment thereof includes a variable heavy chain region including an amino acid sequence at least about 60%, 65%, 70%, 75%, 80%, 85%, 86%, 87%, 88%, 89%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, 99%, or 100% identical to a variable heavy chain region amino acid sequence of A3-25 as set forth in SEQ ID NO: 49.

In one embodiment, the antibody or antigen binding fragment thereof includes a variable heavy chain region including an amino acid sequence at least about 60%, 65%, 70%, 75%, 80%, 85%, 86%, 87%, 88%, 89%, 90%, 91%, 92%, 93%, 94%, 95%, 96%,

97%, 98%, 99%, or 100% identical to a variable heavy chain region amino acid sequence of A3-25 as set forth in SEQ ID NO: 60.

In one embodiment, the antibody or antigen binding fragment thereof includes a variable heavy chain region including an amino acid sequence at least about 60%, 65%, 70%, 75%, 80%, 85%, 86%, 87%, 88%, 89%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, 99%, or 100% identical to a variable heavy chain region amino acid sequence of A3-25 as set forth in SEQ ID NO: 71.

In another embodiment, the antibody or antigen binding fragment thereof includes a variable light chain region including an amino acid sequence at least about 60%, 65%, 70%, 75%, 80%, 85%, 86%, 87%, 88%, 89%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, 99%, or 100% identical to a variable light chain region amino acid sequence of A3-25 as set forth in SEQ ID NO: 55.

In another embodiment, the antibody or antigen binding fragment thereof includes a variable light chain region including an amino acid sequence at least about 60%, 65%, 70%, 75%, 80%, 85%, 86%, 87%, 88%, 89%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, 99%, or 100% identical to a variable light chain region amino acid sequence of A3-25 as set forth in SEQ ID NO: 66.

In another embodiment, the antibody or antigen binding fragment thereof includes a variable light chain region including an amino acid sequence at least about 60%, 65%, 70%, 75%, 80%, 85%, 86%, 87%, 88%, 89%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, 99%, or 100% identical to a variable light chain region amino acid sequence of A3-25 as set forth in SEQ ID NO: 77.

The amino acid sequence for the variable heavy chain of a neutralizing antibody of *C. difficile* TcdB (B8-26 mAb) is set forth in SEQ ID NO: 49. See Table 25-a.

Table 25-a: Variable Heavy Chain Amino Acid Sequences			
Clone	Region	Amino Acid Sequence	SEQ ID NO:
B8-26	Signal peptide	MGWSCIILFLVATATGVHS	50
	Variable heavy chain	QVQLQQPGAELVKPGA PVKLSCKAS GYSFTSYWMN WVKQRPGRGLEWIG RIDPSNSEIYYNQKF KDKATLTVDKSSSTAYIQLSSL TSEDSAVYYCAS GHYGSIFAY WGQGTTLTVSS	49
	CDR1	GYSFTSYWMN	51
	CDR2	RIDPSNSEIYYNQKF	52
	CDR3	GHYGSIFAY	53
	Constant region (IgG1)	AKTTPPSVYPLAPGNSK	54

The amino acid sequence for the variable light chain of a neutralizing antibody of *C. difficile* TcdB (B8-26 mAb) is set forth in SEQ ID NO: 55. See Table 25-b.

Table25-b: Variable Light (κ) Chain Amino Acid Sequences

Clone	Region	Amino Acid Sequence	SEQ ID NO:
B8-26	Signal peptide	MRFQVQVLGLLLLWISGAQCD	56
	Variable light chain	VQITQSPSYLAASPGETITINC RASKSISKYLA WYQEKPGKTNKLLLY SGSTLQS GIPS RFSGSRSGTDFTLIISSLEPEDSAMYYC QQHNEYPLT FGAGTKLELKRADAAPTVSIFPPSSEEFQ	55
	CDR1	RASKSISKYLA	57
	CDR2	SGSTLQS	58
	CDR3	QQHNEYPLT	59

In one embodiment, the antibody or binding fragment thereof includes amino acid sequences of the heavy chain CDRs as shown in SEQ ID NOs: 51 (CDR H1), 52 (CDR H2) and 53 (CDR H3), and/or the amino acid sequences of the light chain CDRs as shown in SEQ ID NOs: 57 (CDR L1), 58 (CDR L2) and 59 (CDR L3).

The amino acid sequence for the variable heavy chain of a neutralizing antibody of *C. difficile* TcdB (B59-3 mAb) is set forth in SEQ ID NO: 60. See Table 26-a.

Table 26-a: Variable Heavy Chain Amino Acid Sequences

Clone	Region	Amino Acid Sequence	SEQ ID NO:
B59-3	Signal peptide	MGWSYIILFLVATATDVHS	61
	Variable heavy chain	QVQLQQPGAELVKPGASVKLS CKAS GYTFTSYWMH WVKQRPGQGLEWIG VINPSNGRSTYSEKF KTTATVTVDKSSSTAYMQL SILTSEDSAVYYCAR AYYSTSYYAMDY WGQGTSVTVSS	60
	CDR1	GYTFTSYWMH	62
	CDR2	VINPSNGRSTYSEKF	63
	CDR3	AYYSTSYYAMDY	64
	Constant region (IgG1)	AKTTPPSVYPLAPGNSK	65

The amino acid sequence for the variable light chain of a neutralizing antibody of *C. difficile* TcdB (B59-3 mAb) is set forth in SEQ ID NO: 66. See Table 26-b.

Table 26-b: Variable Light (κ) Chain Amino Acid Sequences

Clone	Region	Amino Acid Sequence	SEQ ID NO:
B59-3	Signal peptide	MKLPVRLLVLMFWIPASSSD	67
	Variable light chain	VLMTQSPLSLPVSLGDQASIS C RSSQNIVHSNGNTYLE WYLQKPGQSPKLLIY KVSNRFS GVPDRFSGSGSGTYFTLKISRVEAEDLGVYYC FQGSHFPFT FGTGTKLEIKRADAAPTVSIFPPSSEEFQ	66
	CDR1	RSSQNIVHSNGNTYLE	68
	CDR2	KVSNRFS	69
	CDR3	FQGSHFPFT	70

In one embodiment, the antibody or binding fragment thereof includes amino acid sequences of the heavy chain CDRs as shown in SEQ ID NOs: 62 (CDR H1), 63 (CDR H2) and 64 (CDR H3), and/or the amino acid sequences of the light chain CDRs as shown in SEQ ID NOs: 68 (CDR L1), 69 (CDR L2) and 70 (CDR L3).

The amino acid sequence for the variable heavy chain of a neutralizing antibody of *C. difficile* TcdB (B9-30 mAb) is set forth in SEQ ID NO: 71. See Table 27-a.

Table 27-a: Variable Heavy Chain Amino Acid Sequences

Clone	Region	Amino Acid Sequence	SEQ ID NO:
B9-30	Signal peptide	MGWSCIILFLVATATGVHS	72
	Variable heavy chain	QVQLQQPGAEVVKPGAPVKLS CKAS GYPFTNYWMN WVKQRPGRGLEWIG RIDPSNSEIYYNQKF KDKATLTVDKSSSTAYIQLSSLTSEDSAVYY CAS GHYGSIFAY WGQGTTLTVSS	71
	CDR1	GYPFTNYWMN	73
	CDR2	RIDPSNSEIYYNQKF	74
	CDR3	GHYGSIFAY	75
	Constant region (IgG1)	AKTTPPSVYPLAPGNSK	76

The amino acid sequence for the variable light chain of a neutralizing antibody of *C. difficile* TcdB (B9-30 mAb) is set forth in SEQ ID NO: 77. See Table 27-b.

Table 27-b: Variable Light (κ) Chain Amino Acid Sequences

Clone	Region	Amino Acid Sequence	SEQ ID NO:
B9-30	Signal peptide	MRFQVQVLGLLLLWISGAQCD	78
	Variable light chain	VQITQSPSYLAASPGETITINC RASKSISKYLA WYQEKPGKTNKLLIY SGSTLQS GIPS RFSGSRSGTDFTLIISSLEPEDSAMYYC QQHNEYPLT FGAGTKLELKRADAAPTVSIFPPSSEEFQ	77
	CDR1	RASKSISKYLA	79
	CDR2	SGSTLQS	80
	CDR3	QQHNEYPLT	81

In one embodiment, the antibody or binding fragment thereof includes amino acid sequences of the heavy chain CDRs as shown in SEQ ID NOs: 73 (CDR H1), 74 (CDR H2) and 75 (CDR H3), and/or the amino acid sequences of the light chain CDRs as shown in SEQ ID NOs: 79 (CDR L1), 80 (CDR L2) and 81 (CDR L3).

In one aspect, the invention relates to an antibody or binding fragment thereof specific to a wild type *C. difficile* TcdB from any *C. difficile* strain, such as those described above, e.g., to SEQ ID NO: 2. In another aspect, the invention relates to an antibody or binding fragment thereof specific to an immunogenic composition described above. For example, in one embodiment, the antibody or binding fragment thereof is specific to an immunogenic composition that includes SEQ ID NO: 6 or SEQ ID NO: 8. In another embodiment, the antibody or binding fragment thereof is specific to an immunogenic composition that includes SEQ ID NO: 6 or SEQ ID NO: 8, wherein at least one amino acid of SEQ ID NO: 6 or SEQ ID NO: 8 is crosslinked by formaldehyde, EDC, NHS, or a combination of EDC and NHS.

Antibodies or binding fragments thereof having a variable heavy chain and variable light chain regions that are at least about 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, preferably about 98%, more preferably about 99% or most preferably about 100% identity to the variable heavy and light chain regions of B2-31; B5-40, B70-2; B6-30; B9-30; B59-3; B60-2; B56-6; and/or, preferably, B8-26 can also bind to TcdB.

In one embodiment, the antibody or antigen binding fragment thereof includes a variable heavy chain region including an amino acid sequence at least about 60%, 65%, 70%, 75%, 80%, 85%, 86%, 87%, 88%, 89%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, 99%, or 100% identical to a variable heavy chain region amino acid sequence of B8-26 (SEQ ID NO: 49).

In another embodiment, the antibody or antigen binding fragment thereof includes a variable light chain region including an amino acid sequence at least about 60%, 65%, 70%, 75%, 80%, 85%, 86%, 87%, 88%, 89%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, 99%, or 100% identical to a variable light chain region amino acid sequence of B8-26 (SEQ ID NO: 55).

In yet a further aspect, the antibody or antigen binding fragment thereof includes a variable heavy chain region including an amino acid sequence at least about 60%, 65%, 70%, 75%, 80%, 85%, 86%, 87%, 88%, 89%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, 99%, or 100% identical to a variable heavy chain region amino acid sequenceof B8-26 (SEQ ID NO: 49), and a variable light chain region including an amino acid sequence at least about 60%, 65%, 70%, 75%, 80%, 85%, 86%, 87%, 88%, 89%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, 99%, or 100% identical to a variable light chain region amino acid sequence of B8-26 (SEQ ID NO: 55).

In another embodiment, antibodies or binding fragments thereof having CDRs of variable heavy chains and/or variable light chains of B2-31; B5-40, B70-2; B6-30; B9-30; B59-3; B60-2; B56-6; and/or, preferably, B8-26 can also bind to TcdB.

In one embodiment, the antibody or binding fragment thereof includes amino acid sequences of the heavy chain complementarity determining regions (CDRs) of B8-26, and/or the amino acid sequences of the light chain CDRs of B8-26.

In a preferred embodiment, the antibody or binding fragment thereof specific to *C. difficile* toxin B specifically binds to an epitope within the N-terminal region of toxin B, e.g., an epitope between amino acids 1-1256 of a TcdB, according to the numbering of SEQ ID NO: 2. Examples include B2-31; B5-40; B8-26; B70-2; B6-30; and B9-30.

In an exemplary embodiment, the antibody or binding fragment thereof specific to *C. difficile* toxin B specifically binds to an epitope within the C-terminal region of toxin B, e.g., an epitope between amino acids 1832 to 2710 of a TcdB, according to the numbering of SEQ ID NO: 2.

In yet another embodiment, the antibody or binding fragment thereof specific to *C. difficile* toxin B specifically binds to an epitope within the "translocation" region of C. *difficile* toxin B, e.g., an epitope that preferably includes residues 956-1128 of a TcdB, according to the numbering of SEQ ID NO: 2, such as an epitope between amino acids 659-1832 of a TcdB. Examples include B59-3; B60-2; and B56-6.

Combinations of antibodies

The anti-toxin antibody or binding fragment thereof can be administered in combination with other anti- *C. difficile* toxin antibodies (e.g., other monoclonal antibodies, polyclonal gamma-globulin) or a binding fragment thereof. Combinations that can be used include an anti-toxin A antibody or binding fragment thereof and an anti-toxin B antibody or binding fragment thereof.

In another embodiment, a combination includes an anti-toxin A antibody or binding fragment thereof and another anti-toxin A antibody or binding fragment thereof. Preferably, the combination includes a neutralizing anti-toxin A monoclonal antibody or binding fragment thereof and another neutralizing anti-toxin A monoclonal antibody or binding fragment thereof. Surprisingly, the inventors discovered that such a combination resulted in a synergistic effect in neutralization of toxin A cytotoxicity. For example, the combination includes a combination of at least two of the following neutralizing anti-toxin A monoclonal antibodies: A3-25; A65-33; A60-22; and A80-29. More preferably, the combination includes A3-25 antibody and at least one of the following neutralizing anti-toxin A monoclonal antibodies: A65-33; A60-22; and A80-29. Most preferably, the combination includes all four antibodies: A3-25; A65-33; A60-22; and A80-29.

In a further embodiment, a combination includes an anti-toxin B antibody or binding fragment thereof and another anti-toxin B antibody or binding fragment thereof. Preferably, the combination includes a neutralizing anti-toxin B monoclonal antibody or binding fragment thereof and another neutralizing anti-toxin B monoclonal antibody or binding fragment thereof. Surprisingly, the inventors discovered that such a combination resulted in a synergistic effect in neutralization of toxin B cytotoxicity. More preferably, the combination includes a combination of at least two of the following neutralizing anti-toxin B monoclonal antibodies: B8-26; B9-30 and B59-3. Most preferably, the combination includes all three antibodies: B8-26; B9-30 and B59-3.

In yet another embodiment, a combination includes an anti-toxin B antibody or binding fragment thereof and another anti-toxin B antibody or binding fragment thereof. As stated previously, the inventors discovered that a combination of at least two of the neutralizing monoclonal antibodies can exhibit an unexpectedly synergistic effect in respective neutralization of toxin A and toxin B.

In another embodiment, the agents of the invention can be formulated as a mixture, or chemically or genetically linked using art recognized techniques thereby resulting in covalently linked antibodies (or covalently linked antibody fragments), having both anti-toxin A and anti-toxin B binding properties. The combined formulation may be guided by a determination of one or more parameters such as the affinity, avidity, or biological efficacy of the agent alone or in combination with another agent.

Such combination therapies are preferably additive and/or synergistic in their therapeutic activity, e.g., in the inhibition, prevention (e.g., of relapse), and/or treatment of *C. difficile* - related diseases or disorders. Administering such combination therapies can decrease the dosage of the therapeutic agent (e.g., antibody or antibody fragment mixture, or cross-linked or genetically fused bispecific antibody or antibody fragment) needed to achieve the desired effect.

It is understood that any of the inventive compositions, for example, an anti-toxin A and/or anti-toxin B antibody or binding fragment thereof, can be combined in different ratios or amounts for therapeutic effect. For example, the anti-toxin A and anti-toxin B antibody or respective binding fragment thereof can be present in a composition at a ratio in the range of 0.1:10 to 10:0.1, A:B. In another embodiment, the anti-toxin A and anti-toxin B antibody or respective binding fragment thereof can be present in a composition at a ratio in the range of 0.1:10 to 10:0.1, B:A.

In another aspect, the invention relates to a method of producing a neutralizing antibody against a *C. difficile* TcdA. The method includes administering an immunogenic composition as described above to a mammal, and recovering the antibody from the mammal. In a preferred embodiment, the immunogenic composition includes a mutant *C. difficile* TcdA having SEQ ID NO: 4, wherein at least one amino acid of the mutant *C. difficile* TcdA is chemically crosslinked, preferably by formaldehyde or 1-ethyl-3-(3-dimethylaminopropyl) carbodiimide. Exemplary neutralizing antibodies against TcdA that may be produced include A65-33; A60-22; A80-29 and/or A3-25.

In yet another aspect, the invention relates to a method of producing a neutralizing antibody against a *C. difficile* TcdB. The method includes administering an immunogenic composition as described above to a mammal, and recovering the antibody from the mammal. In a preferred embodiment, the immunogenic composition includes a mutant *C. difficile* TcdB having SEQ ID NO: 6, wherein at least one amino acid of the mutant *C. difficile* TcdB is chemically crosslinked, preferably by formaldehyde or 1-ethyl-3-(3-dimethylaminopropyl) carbodiimide. Exemplary neutralizing antibodies against TcdB that may be produced include B2-31; B5-40, B70-2; B6-30; B9-30; B59-3; B60-2; B56-6; and/or B8-26.

Formulations

Compositions of the present invention (such as, e.g., compositions including a mutant *C. difficile* toxin, immunogenic compositions, antibodies and/or antibody binding fragments thereof described herein) may be in a variety of forms. These include, for example, semi-solid and solid dosage forms, suppositories, liquid forms, such as liquid solutions (e.g., injectable and infusible solutions), dispersions or suspensions, liposomes, and/or dried form, such as, for example, lyophilized powder form, freeze-dried form, spray-dried form, and/or foam-dried form. For suppositories, binders and carriers include, for example, polyalkylene glycols or triglycerides; such suppositories can be formed from mixtures containing the inventive compositions. In an exemplary embodiment, the composition is in a form that is suitable for solution in, or suspension in, liquid vehicles prior to injection. In another exemplary embodiment, the composition is emulsified or encapsulated in liposomes or microparticles, such as polylactide, polyglycolide, or copolymer.

In a preferred embodiment, the composition is lyophilized and extemporaneously reconstituted prior to use.

In one aspect, the present invention relates to pharmaceutical compositions that include any of the compositions described herein (such as, e.g., compositions including a mutant *C. difficile* toxin, immunogenic compositions, antibodies and/or antibody binding fragments thereof described herein), formulated together with a pharmaceutically acceptable carrier. "Pharmaceutically acceptable carriers" include any solvents, dispersion media, stabilizers, diluents, and/or buffers that are physiologically suitable.

Exemplary stabilizers include carbohydrates, such as sorbitol, mannitol, starch, dextran, sucrose, trehalose, lactose, and/or glucose; inert proteins, such as albumin and/or casein; and/or other large, slowly metabolized macromolecules, such as polysaccharides such as chitosan, polylactic acids, polyglycolic acids and copolymers (such as latex functionalized SEPHAROSE™ agarose, agarose, cellulose, etc/), amino acids, polymeric amino acids, amino acid copolymers, and lipid aggregates (such as oil droplets or liposomes). Additionally, these carriers may function as immunostimulating agents (i.e., adjuvants).

Preferably, the composition includes trehalose. Preferred amounts of trehalose (% by weight) include from a minimum of about 1%, 2%, 3%, or 4% to a maximum of about 10%, 9%, 8%, 7%, 6%, or 5%. Any minimum value can be combined with any maximum value to define a suitable range. In one embodiment, the composition includes about 3% - 6% trehalose, most preferably, 4.5% trehalose, for example, per 0.5 mL dose.

Examples of suitable diluents include distilled water, saline, physiological phosphate-buffered saline, glycerol, alcohol (such as ethanol), Ringer's solutions, dextrose solution, Hanks' balanced salt solutions, and/or a lyophilization excipient.

Exemplary buffers include phosphate (such as potassium phosphate, sodium phosphate); acetate (such as sodium acetate); succinate (such as sodium succinate); glycine; histidine; carbonate, Tris (tris(hydroxymethyl)aminomethane), and/or bicarbonate (such as ammonium bicarbonate) buffers. Preferably, the composition includes tris buffer. Preferred amounts of tris buffer include from a minimum of about 1 mM, 5 mM, 6 mM, 7 mM, 8 mM, 9 mM, 10 mM to a maximum of about 100 mM, 50 mM, 20 mM,19 mM, 18 mM, 17 mM, 16 mM, 15 mM, 14 mM, 13 mM, 12 mM, or 11 mM. Any minimum value can be combined with any maximum value to define a suitable range. In one embodiment, the composition includes about 8 mM to 12 mM tris buffer, most preferably, 10 mM tris buffer, for example, per 0.5 mL dose.

In another preferred embodiment, the composition includes histidine buffer. Preferred amounts of histidine buffer include from a minimum of about 1 mM, 5 mM, 6 mM, 7 mM, 8 mM, 9 mM, 10 mM to a maximum of about 100 mM, 50 mM, 20 mM,19 mM, 18 mM, 17 mM, 16 mM, 15 mM, 14 mM, 13 mM, 12 mM, or 11 mM. Any minimum value can be combined with any maximum value to define a suitable range. In one embodiment, the composition includes about 8 mM to 12 mM histidine buffer, most preferably, 10 mM histidine buffer, for example, per 0.5 mL dose.

In yet another preferred embodiment, the composition includes phosphate buffer. Preferred amounts of phosphate buffer include from a minimum of about 1 mM, 5 mM, 6 mM, 7 mM, 8 mM, 9 mM, 10 mM to a maximum of about 100 mM, 50 mM, 20 mM,19 mM, 18 mM, 17 mM, 16 mM, 15 mM, 14 mM, 13 mM, 12 mM, or 11 mM. Any minimum value can be combined with any maximum value to define a suitable range. In one embodiment, the composition includes about 8 mM to 12 mM phosphate buffer, most preferably, 10 mM phosphate buffer, for example, per 0.5 mL dose.

The pH of the buffer will generally be chosen to stabilize the active material of choice, and can be ascertainable by those in the art by known methods. Preferably, the pH of the buffer will be in the range of physiological pH. Thus, preferred pH ranges are from about 3 to about 8; more preferably, from about 6.0 to about 8.0; yet more preferably, from about 6.5 to about 7.5; and most preferably, at about 7.0 to about 7.2.

In some embodiments, the pharmaceutical compositions may include a surfactant. Any surfactant is suitable, whether it is amphoteric, non-ionic, cationic or anionic. Exemplary surfactants include the polyoxyethylene sorbitan esters surfactants (e.g., TWEEN ®), such as polysorbate 20 and/or polysorbate 80; polyoxyethylene fatty ethers derived from lauryl, cetyl, stearyl and oleyl alcohols (known as Brij surfactants), such as triethyleneglycol monolauryl ether (Brij 30); Triton X 100, or t-octylphenoxypolyethoxyethanol; and sorbitan esters (commonly known as the SPANs), such as sorbitan trioleate (Span 85) and sorbitan monolaurate, and combinations thereof. Preferred surfactants include polysorbate 80 (polyoxyethylene sorbitan monooleate).

Preferred amounts of polysorbate 80 (% by weight) include from a minimum of about 0.001%, 0.005%, or 0.01%, to a maximum of about 0.010%, 0.015%, 0.025%, or 1.0%. Any minimum value can be combined with any maximum value to define a suitable range. In one embodiment, the composition includes about 0.005% - 0.015% polysorbate 80, most preferably, 0.01% polysorbate 80.

In an exemplary embodiment, the immunogenic composition includes trehalose and phosphate 80. In another exemplary embodiment, the immunogenic composition includes tris buffer and polysorbate 80. In another exemplary embodiment, the immunogenic composition includes histidine buffer and polysorbate 80. In yet another exemplary embodiment, the immunogenic composition includes phosphate buffer and polysorbate 80.

In one exemplary embodiment, the immunogenic composition includes trehalose, tris buffer and polysorbate 80. In another exemplary embodiment, the immunogenic composition includes trehalose, histidine buffer and polysorbate 80. In yet another exemplary embodiment, the immunogenic composition includes trehalose, phosphate buffer and polysorbate 80.

The compositions described herein may further include components of petroleum, animal, vegetable, or synthetic origin, for example, peanut oil, soybean oil, and/or mineral oil. Examples include glycols such as propylene glycol or polyethylene glycol.

In some embodiments, the pharmaceutical composition further includes formaldehyde. For example, in a preferred embodiment, a pharmaceutical composition that further includes formaldehyde has an immunogenic composition, wherein the mutant *C. difficile* toxin of the immunogenic composition has been contacted with a chemical crosslinking agent that includes formaldehyde. The amount of formaldehyde present in the pharmaceutical composition may vary from a minimum of about 0.001%, 0.002%, 0.003%, 0.004%, 0.005%, 0.006%, 0.007%, 0.008%, 0.009%, 0.010%, 0.013%, or 0.015%, to a maximum of about 0.020%, 0.019%, 0.018%, 0.017% 0.016%, 0.015%, 0.014%, 0.013%, 0.012% 0.011% or 0.010%. Any minimum value can be combined with any maximum value to define a suitable range. In one embodiment, the pharmaceutical composition includes about 0.010% formaldehyde.

In some alternative embodiments, the pharmaceutical compositions described herein do not include formaldehyde. For example, in a preferred embodiment, a pharmaceutical composition that does not include formaldehyde has an immunogenic composition, wherein at least one amino acid of the mutant *C. difficile* toxin is chemically crosslinked by an agent that includes EDC. More preferably, in such an embodiment, the mutant *C. difficile* toxin has not been contacted with a chemical crosslinking agent that includes formaldehyde. As another exemplary embodiment, a pharmaceutical composition that is in a lyophilized form does not include formaldehyde.

In another embodiment, the compositions described herein may include an adjuvant, as described below. Preferred adjuvants augment the intrinsic immune response to an immunogen without causing conformational changes in the immunogen that may affect the qualitative form of the immune response.

Exemplary adjuvants include 3 De-O-acylated monophosphoryl lipid A (MPL™) (see GB 2220211 (GSK)); an aluminum hydroxide gel such as Alhydrogel™ (Brenntag Biosector, Denmark); aluminum salts (such as aluminum hydroxide, aluminum phosphate, aluminum sulfate), which may be used with or without an immunostimulating agent such as MPL or 3-DMP, QS-21, polymeric or monomeric amino acids such as polyglutamic acid or polylysine.

Yet another exemplary adjuvant is an immunostimulatory oligonucleotide such as a CpG oligonucleotide (see, e.g., WO 1998/040100, WO2010/067262), or a saponin and an immunostimulatory oligonucleotide, such as a CpG oligonucleotide (see, e.g., WO 00/062800). In a preferred embodiment, the adjuvant is a CpG oligonucleotide, most preferably a CpG oligodeoxynucleotides (CpG ODN). Preferred CpG ODN are of the B Class that preferentially activate B cells. In aspects of the invention, the CpG ODN has the nucleic acid sequence 5' T*C*G*T*C*G*T*T*T*T*T*C*G*G*T*G*C*T*T*T*T 3' (SEQ ID NO: 48) wherein * indicates a phosphorothioate linkage. The CpG ODN of this sequence is known as CpG 24555, which is described in WO2010/067262. In a preferred embodiment, CpG 24555 is used together with an aluminium hydroxide salt such as Alhydrogel.

A further class of exemplary adjuvants include saponin adjuvants, such as Stimulon™ (QS-21, which is a triterpene glycoside or saponin, Aquila, Framingham, Mass.) or particles generated therefrom such as ISCOMs (immune stimulating complexes) and ISCOMATRIX ® adjuvant. Accordingly, the compositions of the present invention may be delivered in the form of ISCOMs, ISCOMS containing CTB, liposomes or encapsulated in compounds such as acrylates or poly(DL-lactide-co-glycoside) to form microspheres of a size suited to adsorption. Typically, the term "ISCOM" refers to immunogenic complexes formed between glycosides, such as triterpenoid saponins (particularly Quil A), and antigens which contain a hydrophobic region. In a preferred embodiment, the adjuvant is an ISCOMATRIX adjuvant.

Other exemplary adjuvants include RC-529, GM-CSF and Complete Freund's Adjuvant (CFA) and Incomplete Freund's Adjuvant (IFA).

Yet another class of exemplary adjuvants is glycolipid analogues including N-glycosylamides, N-glycosylureas and N-glycosylcarbamates, each of which is substituted in the sugar residue by an amino acid.

Optionally, the pharmaceutical composition includes two or more different adjuvants. Preferred combinations of adjuvants include any combination of adjuvants including, for example, at least two of the following adjuvants: alum, MPL, QS-21, ISCOMATRIX, CpG, and Alhydrogel. An exemplary combination of adjuvants includes a combination of CpG and Alhydrogel.

Alternatively, in one embodiment, the composition is administered to the mammal in the absence of an adjuvant.

Compositions described herein can be administered by any route of administration, such as, for example, parenteral, topical, intravenous, mucosal, oral, subcutaneous, intraarterial, intracranial, intrathecal, intraperitoneal, intranasal, intramuscular, intradermal, infusion, rectal, and/or transdermal routes for prophylactic and/or therapeutic applications. In a preferred embodiment, the route of administration of the composition is parenteral, more preferably, intramuscular administration. Typical intramuscular administration is performed in the arm or leg muscles.

Compositions described herein can be administered in combination with therapies that are at least partly effective in prevention and/or treatment of *C. difficile* infection. For example, a composition of the invention may be administered before, concurrently with, or after biotherapy; probiotic therapy; stool implants; immunotherapy (such as intravenous immunoglobulin); and/or an accepted standard of care for the antibiotic treatment of *C. difficile* associated disease (CDAD), such as metronidazole and/or vancomycin.

A composition of the present invention relating to toxin A and toxin B may be administered to the mammal in any combination. For example, an immunogenic composition including a mutant *C. difficile* TcdA may be administered to the mammal before, concurrently with, or after administration of an immunogenic composition including a mutant *C. difficile* TcdB. Conversely, an immunogenic composition including a mutant *C. difficile* TcdB may be administered to the mammal before, concurrently with, or after administration of an immunogenic composition including a mutant *C. difficile* TcdA.

In another embodiment, a composition including an anti-toxin A antibody or binding fragment thereof may be administered to the mammal before, concurrently with, or after administration of a composition including an anti-toxin B antibody or binding fragment thereof. Conversely, a composition including an anti-toxin B antibody or binding fragment thereof may be administered to the mammal before, concurrently with, or after administration of a composition including an anti-toxin A antibody or binding fragment thereof.

In a further embodiment, a composition of the present invention may be administered to the mammal before, concurrently with, or after administration of a pharmaceutically acceptable carrier. For example, an adjuvant may be administered before, concurrently with, or after administration of a composition including a mutant *C.*

difficile toxin. Accordingly, a composition of the present invention and a pharmaceutically acceptable carrier can be packaged in the same vial or they can be packaged in separate vials and mixed before use. The compositions can be formulated for single dose administration and/or multiple dose administration.

5

Methods of Protecting and/or Treating *C. difficile* infection in a Mammal

In one aspect, the invention relates to a method of inducing an immune response to a *C. difficile* toxin in a mammal. The method includes administering an effective amount of a composition described herein to the mammal. For example, the method may include administering an amount effective to generate an immune response to the respective *C. difficile* toxin in the mammal.

In an exemplary embodiment, the invention relates to a method of inducing an immune response to a *C. difficile* TcdA in a mammal. The method includes administering an effective amount of an immunogenic composition that includes a mutant *C. difficile* TcdA to the mammal. In another exemplary embodiment, the invention relates to a method of inducing an immune response to a *C. difficile* TcdB in a mammal. The method includes administering an effective amount of an immunogenic composition that includes a mutant *C. difficile* TcdB to the mammal.

In a further embodiment, the method includes administering an effective amount of an immunogenic composition that includes a mutant *C. difficile* TcdA and an effective amount of an immunogenic composition that includes a mutant *C. difficile* TcdB to the mammal. In additional aspects, the compositions described herein may be used to treat, prevent, decrease risk of, decrease severity of, decrease occurrences of, and/or delay outset of a *C. difficile* infection, *C. difficile* associated disease, syndrome, condition, symptom, and/or complication thereof in a mammal, as compared to a mammal to which the composition is not administered. The method includes administering an effective amount of the composition to the mammal.

Three clinical syndromes caused by *C. difficile* infection are recognized, based on the severity of the infection. The most severe form is pseudomembranous colitis (PMC), which is characterized by profuse diarrhea, abdominal pain, systemic signs of illness, and a distinctive endoscopic appearance of the colon.

Antibiotic-associated colitis (AAC) is also characterized by profuse diarrhea, abdominal pain and tenderness, systemic signs (e.g., fever), and leukocytosis. Intestinal injury in AAC is less severe than in PMC, the characteristic endoscopic appearance of the colon in PMC is absent, and mortality is low.

Finally, antibiotic-associated diarrhea (AAD, which is also known as *C. difficile* associated diarrhea (CDAD) is a relatively mild syndrome, and is characterized by mild

to moderate diarrhea, lacking both large intestinal inflammation (as characterized by, e.g., abdominal pain and tenderness) and systemic signs of infection (e.g., fever).

These three distinct syndromes typically occur in an increasing order of frequency. That is, PMC typically occurs less frequently than AAC, and AAD is typically the most frequent clinical presentation of *C. difficile* disease.

A frequent complication of *C. difficile* infection is recurrent or relapsing disease, which occurs in up to 20% of all subjects who recover from *C. difficile* disease. Relapse may be characterized clinically as AAD, AAC, or PMC. Patients who relapse once are more likely to relapse again.

As used herein, conditions of a *C. difficile* infection include, for example, mild, mild-to-moderate, moderate, and severe *C. difficile* infection. A condition of *C. difficile* infection may vary depending on presence and/or severity of symptoms of the infection.

Symptoms of a *C. difficile* infection may include physiological, biochemical, histologic and/or behavioral symptoms such as, for example, diarrhea; colitis; colitis with cramps, fever, fecal leukocytes, and inflammation on colonic biopsy; pseudomembranous colitis; hypoalbuminemia; anasarca; leukocytosis; sepsis; abdominal pain; asymptomatic carriage; and/or complications and intermediate pathological phenotypes present during development of the infection, and combinations thereof, etc. Accordingly, for example, administration of an effective amount of the compositions described herein may, for example treat, prevent, decrease risk of, decrease severity of, decrease occurrences of, and/or delay outset of diarrhea; abdominal pain, cramps, fever, inflammation on colonic biopsy, hypoalbuminemia, anasarca, leukocytosis, sepsis, and/or asymptomatic carriage, etc., as compared to a mammal to which the composition was not administered.

Risk factors of a *C. difficile* infection may include, for example, present or immediate future use of an antimicrobial (any antimicrobial agent with an antibacterial spectrum and/or activity against anaerobic bacteria are encompassed, including, for example, antibiotics that cause disruption of normal colonic microbiota, e.g., clindamycin, cephalosporins, metronidazole, vancomycin, fluoroquinolones (including levofloxacin, moxifloxacin, gatifloxacin, and ciprofloxacin), linezolid, etc.); present or immediate future withdrawal of prescribed metronidazole or vancomycin; present or immediate future admission to a healthcare facility (such as a hospital, chronic care facility, etc.) and healthcare workers; present or immediate future treatment with proton-

pump inhibitors, H2 antagonists, and/or methotrexate, or a combination thereof; present or risk of gastrointestinal diseases, such as inflammatory bowel disease; past, present, or immediate future gastrointestinal surgery or gastrointestinal procedure on the mammal; past or present recurrence of a *C. difficile* infection and/or a CDAD, e.g., patients who have had a *C. difficile* infection and/or a CDAD once or more than once; and humans aged at least about 65 and above.

In the methods described herein, the mammal may be any mammal, such as, for example, mice, hamsters, primates, and humans. In a preferred embodiment, the mammal is a human. According to the present invention, the human may include individuals who have exhibited a *C. difficile* infection, *C. difficile* associated disease, syndrome, condition, symptom, and/or complication thereof; individuals who are presently exhibiting a *C. difficile* infection, *C. difficile* associated disease, syndrome, condition, symptom, and/or complication thereof; and individuals who are at risk of a *C. difficile* infection, *C. difficile* associated disease, syndrome, condition, symptom, and/or complication thereof.

Examples of individuals who have shown symptoms of *C. difficile* infection include individuals who have shown or are showing symptoms described above; individuals who have had or are having a *C. difficile* infection and/or a *C. difficile* associated disease (CDAD); and individuals who have a recurrence of a *C. difficile* infection and/or CDAD.

Examples of patients who are at risk of a *C. difficile* infection include individuals at risk of or are presently undergoing planned antimicrobial use; individuals at risk of or are presently undergoing withdrawal of prescribed metronidazole or vancomycin; individuals who are at risk of or are presently undergoing a planned admission to a healthcare facility (such as a hospital, chronic care facility, etc.) and healthcare workers; and/or individuals at risk of or are presently undergoing a planned treatment with proton-pump inhibitors, H2 antagonists, and/or methotrexate, or a combination thereof; individuals who have had or are undergoing gastrointestinal diseases, such as inflammatory bowel disease; individuals who have had or are undergoing gastrointestinal surgery or gastrointestinal procedures; and individuals who have had or are having a recurrence of a *C. difficile* infection and/or a CDAD, e.g., patients who have had a *C. difficile* infection and/or a CDAD once or more than once; individuals who

are about 65 years old or older. Such at-risk patients may or may not be presently showing symptoms of a *C. difficile* infection.

In asymptomatic patients, prophylaxis and/or treatment can begin at any age (e.g., at about 10, 20, or 30 years old). In one embodiment, however, it is not necessary to begin treatment until a patient reaches at least about 45, 55, 65, 75, or 85 years old. For example, the compositions described herein may be administered to an asymptomatic human who is aged 50-85 years.

In one embodiment, the method of preventing, decreasing risk of, decreasing severity of, decreasing occurrences of, and/or delaying outset of a *C. difficile* infection, *C. difficile* associated disease, syndrome, condition, symptom, and/or complication thereof in a mammal includes administering an effective amount of a composition described herein to a mammal in need thereof, a mammal at risk of, and/or a mammal susceptible to a *C. difficile* infection. An effective amount includes, for example, an amount sufficient to prevent, decrease risk of, decrease severity of, decrease occurrences of, and/or delay outset of a *C. difficile* infection, *C. difficile* associated disease, syndrome, condition, symptom, and/or complication thereof in a mammal, as compared to a mammal to which the composition is not administered. Administration of an effective amount of the compositions described herein may, for example, prevent, decrease risk of, decrease severity of, decrease occurrences of, and/or delay outset of diarrhea; abdominal pain, cramps, fever, inflammation on colonic biopsy, hypoalbuminemia, anasarca, leukocytosis, sepsis, and/or asymptomatic carriage, etc., as compared to a mammal to which the composition was not administered. In a preferred embodiment, the method includes administering an effective amount of an immunogenic composition described herein to the mammal in need thereof, the mammal at risk of, and/or the mammal susceptible to a *C. difficile* infection.

In an additional embodiment, the method of treating, decreasing severity of, and/or delaying outset of a *C. difficile* infection, *C. difficile* associated disease, syndrome, condition, symptom, and/or complication thereof in a mammal includes administering an effective amount of a composition described herein to a mammal suspected of, or presently suffering from a *C. difficile* infection. An effective amount includes, for example, an amount sufficient to treat, decrease severity of, and/or delay the outset of a *C. difficile* infection, *C. difficile* associated disease, syndrome, condition,

symptom, and/or complication thereof in a mammal, as compared to a mammal to which the composition is not administered.

Administration of an effective amount of the composition may improve at least one sign or symptom of *C. difficile* infection in the subject, such as those described below. Administration of an effective amount of the compositions described herein may, for example, decrease severity of and/or decrease occurrences of diarrhea; decrease severity of and/or decrease occurrences of abdominal pain, cramps, fever, inflammation on colonic biopsy, hypoalbuminemia, anasarca, leukocytosis, sepsis, and/or asymptomatic carriage, etc., as compared to a mammal to which the composition was not administered. Optionally, the presence of symptoms, signs, and/or risk factors of an infection is determined before beginning treatment. In a preferred embodiment, the method includes administering an effective amount of an antibody and/or binding fragment thereof described herein to the mammal suspected of, or presently suffering from, a *C. difficile* infection.

Accordingly, an effective amount of the composition refers to an amount sufficient to achieve a desired effect (e.g., prophylactic and/or therapeutic effect) in the methods of the present invention. For example, the amount of an immunogen for administration may vary from a minimum of about 1 μg, 5 μg, 25 μg, 50 μg, 75 μg, 100 μg, 200 μg, 500 μg, or 1 mg to a maximum of about 2 mg, 1 mg, 500 μg, 200 μg per injection. Any minimum value can be combined with any maximum value to define a suitable range. Typically about 10, 20, 50 or 100 μg per immunogen is used for each human injection.

The amount of a composition of the invention administered to the subject may depend on the type and severity of the infection and/or on the characteristics of the individual, such as general health, age, sex, body weight and tolerance to drugs. It may also depend on the degree, severity, and type of disease. An effective amount may also vary depending upon factors, such as route of administration, target site, physiological state of the patient, age of the patient, whether the patient is human or an animal, other therapies administered, and whether treatment is prophylactic or therapeutic. The skilled artisan will be able to determine appropriate amounts depending on these and other factors.

An effective amount may include one effective dose or multiple effective doses (such as, for example, 2, 3, 4 doses, or more) for use in the methods herein. Effective dosages may need to be titrated to optimize safety and efficacy.

A combination of amount and frequency of dose adequate to accomplish prophylactic and/or therapeutic uses is defined as a prophylatically- or therapeutically-effective regimen. In a prophylactic and/or therapeutic regimen, the composition is typically administered in more than one dosage until a sufficient immune response has been achieved. Typically, the immune response is monitored and repeated dosages are given if the immune response starts to wane.

The compositions may be administered in multiple dosages over a period of time. Treatment can be monitored by assaying antibody, or activated T-cell or B-cell responses to the therapeutic agent (e.g., the immunogenic composition including a mutant *C. difficile* toxin) over time. If the response falls, a booster dosage is indicated.

EXAMPLES

Example 1: Identification of toxin-negative *C. difficile* strains

To identify *C. difficile* strains lacking toxin (A and B) genes and toxin expression, 13 *C. difficile* strains were tested. Culture media of 13 *C. difficile* strains were tested by ELISA for toxin A. Seven strains expressed toxin A: *C. difficile* 14797-2, *C. difficile* 630, *C. difficile* BDMS, *C. difficile* W1194, *C. difficile* 870, *C. difficile* 1253, and *C. difficile* 2149. See Figure 3.

Six strains did not express toxin A and lacked the entire pathogenicity locus: *C. difficile* 1351 (ATCC 43593™), *C. difficile* 3232 (ATCC BAA-1801™), *C. difficile* 7322 (ATCC 43601™), *C. difficile* 5036 (ATCC 43603™), *C. difficile* 4811 (4 ATCC 3602™), and *C. difficile* VPI 11186 (ATCC 700057™). VPI 11186 was selected based upon its effectiveness to take up plasmid DNA by conjugation.

The same 13 strains were tested in a multiplex PCR assay using primers outside of the pathogenicity locus (PaLoc; Braun et al., *Gene.* 1996 Nov 28;181(1-2):29-38.). The PCR results demonstrated the DNA from the 6 toxin A negative strains by ELISA did not amplify any genes from the PaLoc (tcdA-tcdE). The PaLoc flanking sequences (*cdd3* and *cdu2*) were present (data not shown).

Example 2: Inactivation of sporulation pathway in *C. difficile* VPI 11186

Knocking-out the spore-forming function of the *C. difficile* production strain facilitates large scale fermentation in a safe manufacturing environment. The ClosTron system was used to create an asporogenic *C. difficile* strain. See Heap et al., *J Microbiol Methods*. 2009 Jul;78(1):79-85. The ClosTron system allows targeted gene inactivation with a group II intron for site directed insertional inactivation of a *spo0A1* clostridial gene. The toxin-minus production strain VPI11186 was subjected to sporulation inactivation by the ClosTron technology. Erythromycin resistant mutants were selected and the presence of the insertional cassette was confirmed by PCR (not shown). The inability of two independent clones to form spores was confirmed.

Example 3: Genetic modification of toxin A and B genes to inactivate cytotoxicity function

Full-length mutant toxins A and B open reading frames (ORFs) based on strain 630Δ genome sequences were designed for custom synthesis at Blue Heron Biotech. See, for example, SEQ ID NOs: 9-14. The active site for the glucosyltransferase activity responsible for cellular toxicity was altered by two allelic substitutions: D285A/D287A (see SEQ ID NO: 3) for toxin A, and D286A/D288A (see SEQ ID NO: 5) for toxin B. Two nucleotides were mutated in each aspartate (D) codon to create the codon for alanine (A). See, for example, SEQ ID NOs: 9-14. In addition, a pair of vectors expressing mutant toxins lacking cysteine residues was constructed following custom synthesis at Blue Heron Biotech. Seven cysteine residues from mutant toxin A and 9 cysteine residues from mutant toxin B were replaced with alanine. The substitutions include catalytic cysteines of the A and B toxin autocatalytic protease. Also, silent mutations were introduced where necessary to eliminate restriction enzyme sites used for vector construction.

Example 4: pMTL84121*fdx* Expression Vector

The plasmid shuttle vector used for *C. difficile* mutant toxin antigen expression was selected from the pMTL8000-series modular system developed by the Minton lab (see Heap et al., *J Microbiol Methods*. 2009 Jul;78(1):79-85). The chosen vector pMTL84121*fdx* contains the *C. difficile* plasmid pCD6 Gram+ replicon, the *catP* (chloramphenicol/ thiamphenicol) selectable marker, the p15a Gram- replicon and *tra* function, and the *C. sporogenes* feredoxin promoter (*fdx*) and distal multiple cloning site (MCS). Empirical data suggested that the low-copy number p15a replicon conferred greater stability in *E. coli* than the ColE1 alternative. The *fdx* promoter was selected as it yielded higher expression than other promoters tested in experiments with CAT reporter constructs (e.g. *tcdA*, *tcdB*; or heterologous tetR or xylR) (data not shown).

Example 5: Cloning the modified toxin ORFs into pMTL84121*fdx*

Full-length mutant toxin A and B open reading frames (ORFs) based on strain 630Δ genome sequences were subcloned using pMTL84121*fdx* vector multiple cloning *Nde*I and *Bgl*II sites using standard molecular biology techniques. To facilitate cloning, the ORFs were flanked by a proximal *NdeI* site containing the start codon and a *BglII* site just downstream of the stop codon.

Example 6: Site directed mutagenesis of TcdA to create a triple mutant

The catalytic cysteine residue of the autocatalytic protease domain was substituted (i.e., C700A for TcdA and C698A for TcdB) in SEQ ID NOs: 3 and 5, i.e., in each of the "double mutants." For mutagenesis of mutant toxin A, a 2.48kb *Nde*I-*Hind*III fragment from the TcdA D285A/D287A expression plasmid was subcloned into pUC19 (cut with same) and site-directed mutagenesis was performed on this template. Once the new alleles were confirmed by DNA sequence analysis, the modified *Nde*I-*Hind*III fragments were reintroduced into the expression vector pMTL84121*fdx* to create the "triple mutants," i.e., SEQ ID NO: 4 and SEQ ID NO: 6.

Example 7: Site directed mutagenesis of TcdB to create a triple mutant

For mutagenesis of mutant toxin B, a 3.29 kb *Nde*I-*Eco*NI fragment from the mutant toxin B plasmid was modified and reintroduced. As the *Eco*NI site is not present in available cloning vectors a slightly larger 3.5kb *Nde*I-*EcoR*V fragment was subcloned into pUC19 (prepared with *Nde*I-*Sma*I). After mutagenesis, the modified internal 3.3kb *Nde*I-*Eco*NI fragment was excised and used to replace the corresponding mutant toxin B expression vector pMTL84121*fdx* fragment. As the cloning efficiency of this directional strategy was found to be quite low, an alternative strategy for introducing the C698A allele involving replacement of a 1.5 kb *Dra*III was attempted in parallel. Both strategies independently yielded the desired recombinants.

Example 8: Creating additional mutant toxin variants by site-directed mutagenesis

At least twelve different *C. difficile* mutant toxin variants were constructed. Allelic substitutions were introduced into N-terminal mutant toxin gene fragments by site directed mutagenesis (Quickchange® kit). Recombinant toxins were also engineered as reference controls to evaluate the capacity of this plasmid-based system to generate protein quantitatively equivalent in biological activity to native toxins purified from wild-type *C. difficile* strains. In this case, allelic substitutions were introduced to revert the original glucosyltransferase substitutions. In addition, a pair of cysteineless mutant toxin vectors was constructed following custom synthesis at Blue Heron Biotech.

The twelve toxin variants include (1) a mutant *C. difficile* toxin A having a D285A/D287A mutation (SEQ ID NO: 3); (2) a mutant *C. difficile* toxin B having a D286A/D288A mutation (SEQ ID NO: 5); (3) a mutant *C. difficile* toxin A having a D285A/D287A C700A mutation (SEQ ID NO: 4); (4) a mutant *C. difficile* toxin B having

a D286A/D288A C698A mutation (SEQ ID NO: 6); (5) a recombinant toxin A having SEQ ID NO: 1; (6) a recombinant toxin B having SEQ ID NO: 2; (7) a mutant *C. difficile* toxin A having a C700A mutation; (8) a mutant *C. difficile* toxin B having a C698A mutation; (9) a mutant *C. difficile* toxin A having a C700A C597S, C1169S, C1407S, C1623S, C2023S, and C2236S mutation; (10) a mutant *C. difficile* toxin B having a C698A C395S, C595S, C824S, C870S, C1167S, C1625S, C1687S, and C2232S mutation; (11) a mutant *C. difficile* toxin A having a D285A, D287A, C700A, D269A, R272A, E460A, and R462A mutation (SEQ ID NO: 7); and (12) a mutant *C. difficile* toxin B having a D270A, R273A, D286A, D288A, D461A, K463A, and C698A mutation (SEQ ID NO: 8)

Penta mutant toxins were also constructed by site directed mutagenesis and by using the same materials and methods as described above, e.g., in Examples 1-7. The penta mutant for toxin B included the following substitutions D286A/D288A C698A/E970K/E976K (SEQ ID NO: 184). The penta mutant toxin B was expressed in VPI 11186 *spo0A*-negative cells as described above. A western blot using mAb# B8-26 (SEQ ID NO: 49), which is specific to an N-terminal epitope of toxin B, was done to confirm expression of the penta mutant toxin B. In the second, third, and fourth lanes from the left, 50 ng, 30 ng, and 10 ng of purified triple mutant B (SEQ ID NO: 86), respectively, were used as a reference protein. In the fifth and sixth lanes from the left, a 1:100 dilution and a 1:1000 dilution, respectively, of the penta mutant toxin B cell lysate concentrate was assessed. The estimated amount of protein in the penta mutant toxin B concentration is about 1000 ug/mL. As shown on the blot, the penta mutant toxin B (concentrated) exhibits a protein band of expected size at about 270 kD.

Example 9: Stability of Transformants

Rearranged plasmids were obtained with the commonly-used DH5□ *E. coli* lab strain. In contrast, transformations using the Invitrogen Stbl2™ *E. coli* host yielded slow-growing full-length mutant toxin recombinants after three days of growth at 30°C on LB chloramphenicol (25 µg/ml) plates. Lower cloning efficiencies were obtained with related Stbl3™ and Stbl4™ *E. coli* strains, although these lines were found to be stable for plasmid maintenance. Transformants were subsequently propagated in agar or in liquid culture under chloramphenicol selection at 30°C. The use of LB (Miller's) media was also found to improve the recovery and growth of transformants compared with animal-free tryptone-soy based media.

Example 10: Transformation of *C. difficile* with pMTL84121*fdx* encoding wild-type or genetic mutant toxin genes

Transformation of *C. difficile* by *E. coli* conjugal transfer was done essentially as described in Heap et al., *Journal of Microbiological Methods*, 2009. 78(1): p. 79-85. *E. coli* host CA434 was transformed with pMTL84121 *fdx* encoding wild type or variant mutant toxin genes. *E. coli* host CA434 is the intermediate to mobilize expression plasmids into the *C. difficile* production strain VPI 11186 spo0A1. CA434 is a derivative of *E. coli* HB101. This strain harbors the Tra+ Mob+ R702 conjugative plasmid which confers resistance to Km, Tc, Su, Sm/Spe, and Hg (due to Tn1831). Chemically competent or electrocompetent CA434 cells were prepared and expression vector transformants were selected on Miller's LB CAM plates at 30°C. Slow growing colonies appearing after 3 days were picked and amplified in 3 mL LB chloramphenicol cultures until mid-log phase (~24h, 225 rpm, orbital shaker at 30°C). *E. coli* cultures were harvested by low speed (5,000g) centrifugation to avoid breaking pili, and cell pellets were resuspended gently with a wide-bore transfer pipette in 1 mL PBS. Cells were concentrated by low speed centrifugation. Most of the PBS was removed by inversion and the drained pellets were transferred into the anaerobic chamber and resuspended with 0.2 mL of *C. difficile* culture, spotted onto BHIS agar plates and left to grow for 8h or overnight. In the case of mutant toxin A transformants, better results were achieved with overnight conjugation. Cell patches were scraped into 0.5 mL PBS and 0.1 mL was plated on BHIS selection media supplemented with 15 µg/mL thiamphenicol (more potent analog of chloramphenicol) and D-cycloserine / cefoxitin to kill *E. coli* donor cells. Transformants appearing 16-24 h later were purified by re-streaking onto a new BHIS (plus supplements) plate and subsequent cultures were tested for expression of recombinant toxins or mutant toxins. Glycerol permanents and seed stocks were prepared from clones showing good expression. Plasmid minipreps were also prepared from 2 mL cultures using a modified Qiagen kit procedure in which cells were pretreated with lysozyme (not essential). The *C. difficile* miniprep DNA was used as a template for PCR sequencing to verify clone integrity. Alternatively, plasmid maxiprep DNA was prepared from *E. coli* Stbl2™ transformants and sequenced.

Example 11: *C. difficile* expression analysis of the toxin A and B triple mutant (SEQ ID NOs: 4 and 6, respectively) and hepta B mutant (SEQ ID NO: 8)

Transformants were grown either in 2 mL cultures (for routine analysis) or in vent-capped flasks (for time course experiments). Samples (2 mL) were centrifuged briefly (10,000 rpm, 30s) to concentrate the cells: supernatants were decanted and concentrated 10x (Amicon-ultra 30k); pellets were drained and frozen at -80°C. Cell pellets were thawed on ice, resuspended in 1mL lysis buffer (Tris-HCl pH7.5; 1mM EDTA, 15% glycerol) and sonicated (1x 20s burst with microtip). The lysate was centrifuged at 4°C and supernatant was concentrated 5-fold. Samples of supernatant and lysate were combined with sample buffer and heat treated (10 min, 80°C) before loading onto duplicate 3-8% Tris-acetate SDS-PAGE gels (Invitrogen). One gel was stained with Coomassie, the second was electroblotted for western analysis. Toxin A-specific and Toxin B-specific rabbit antisera (Fitgerald; Biodesign) were used to detect mutant toxin A and B variants. Expression of the hepta mutant toxin B (SEQ ID NO: 8) was also confirmed by western blot hybridization.

Example 12: Abrogation of glucosyltransferase activity of the mutant toxins

Genetic double mutant (DM) toxins A and B (SEQ ID NOs: 3 and 5, respectively) and triple mutant (TM) toxins A and B (SEQ ID NOs: 4 and 6, respectively) did not transfer ^{14}C-glucose to 10 µg of RhoA, Rac1 and Cdc42 GTPases in *in vitro* glucosylation assays in the presence of UDP-^{14}C-glucose [30 µM], 50 mM HEPES, pH 7.2, 100 mM KCl, 4 mM $MgCl_2$, 2 mM $MnCl_2$, 1 mM DTT, and 0.1 µg/µL BSA. However, wild-type A and B toxin controls (having SEQ ID NOs: 1 and 2, respectively) transferred ^{14}C-glucose to GTPases efficiently at a low dose of 10 and 1 ng each (and lower- data not shown) (Figures 4A and 4B), even in the presence of 100 µg of mutant toxin (Figure 4B) indicating at least 100,000-fold reduction compared to respective wild-type toxins. Similar results were detected for Cdc42 GTPase (data not shown).

Specifically, in Fig. 4B, wild-type toxin A and toxin B (1ng) or triple mutant toxin A and triple mutant toxin B (100 µg) were incubated with RhoA GTPase in the presence of UDP-^{14}C-glucose for 2 hr at 30°C. As illustrated, 1 ng of wild-type TcdA and TcdB transferred ^{14}C-glucose to RhoA but 100 µg of triple mutant toxin A and triple mutant toxin B did not. When 1 ng of wild-type TcdA or TcdB was spiked into the reaction with respective 100 µg of triple mutant toxin A or triple mutant toxin B, glucosylation of RhoA was detected, indicating the lack of glucosylation inhibitors. The sensitivity of detection

for the glucosylation activity was established to be 1 ng of wild-type toxin in a background of 100 µg mutant toxin (ratio of 1:100,000). The results show that the mutations in the active site of the glucosyltransferase in the triple mutant toxin A and triple mutant toxin B reduced any measurable (less than 100,000-fold lower activity compared to the activity of the respective wild-type toxins) glucosyltransferase activity. A similar assay was also developed to quantify glucosyltransferase activity by TCA precipitation of glucosylated GTPases.

Example 13: Abrogation of Auto-catalytic Cysteine Protease Activity

The function of auto-catalytic cleavage was abrogated in the triple genetic mutants A and B (TM) (SEQ ID NOs: 4 and 6, respectively) when the cysteine protease cleavage site was mutated. As illustrated in Figure 5, the wild type (*wt*) toxins A and B (SEQ ID NOs: 3 and 5, respectively) are cleaved in the presence of inositol-6-phosphate. The double mutant toxins A and B (SEQ ID NOs: 3 and 5, respectively) are also cleaved in the presence of inositol-6-phosphate (data not shown), similar to that for wild-type. Toxin A (SEQ ID NO: 3) is cleaved from 308 kDa into 2 fragments of 245 and 60 kDa. Toxin B (SEQ ID NO: 5) is cleaved from 270 kDa into two fragments of 207 and 63 kDa. The triple genetic mutants A and B (TM) (SEQ ID NOs: 4 and 6, respectively) remain unaffected at 308 and 270 kDa respectively, even in the presence of inositol-6-phosphate. See Figure 5. Therefore, the cysteine protease activity was inactivated by genetic modification.

More specifically, in figure 5, one µg of triple mutant A and triple mutant B were incubated for 90 minutes at room temperature (21 ± 5°C) in parallel with wild-type TcdA and TcdB from List Biologicals. The cleavage reaction was performed in 20 µL volume in Tris-HCl, pH 7.5, 2mM DTT in the presence or absence of inositol-6-phosphate (10mM for TcdA and 0.1 mM for Tcd B). The entire reaction volume was then loaded on a 3 -8% SDS/PAGE; the protein bands were visualized by silver staining. As illustrated, wt Tcd A and TcdB were cleaved into two protein bands of 245kD and 60kD and 207kD and 63 kD, respectively, in the presence of inositol-6-phosphate. The triple mutant toxin A and triple mutant toxin B were not cleaved, thus confirming the C700A mutation in triple mutant toxin A and C698A mutation in triple mutant toxin B blocked cleavage.

Example 14: Residual Cytotoxicity of Triple Mutant Toxins A and B (SEQ ID NOs: 4 and 6, respectively)

The genetic mutant toxins were evaluated for their cytotoxicity by an *in vitro* cytotoxicity assay in IMR90 cells, a human diploid lung fibroblast cell line. These cells are sensitive to both toxin A and B. As an alternative preferred embodiment, Vero normal kidney cells from *Cercopithecus aethiops* may be used in the cytotoxicity assay since they were observed to have reasonable sensititivities to toxin A and B. Preferably, HT-29 human colorectal adenocarcinoma cells are not used in the cytotoxicity assay because they have shown significantly decreased sensititivities to the toxins, as compared to the Vero and IMR90 cell lines. See, for example, Table 6 below.

Table 6: Cell Line Sensitivities to Toxins A and B*

Cell line	Toxin 50 µg/ml	Cells/well	EC_{50} (pg/ml)	
			48 hours	72 hours
Vero (ATCC CCL-81™)	A	10000	1816	244
	B	10000	62	29
IMR90 (ATCC CCL-186TM)	A	10000	1329	1152
	B	10000	14	13
HT-29 (ATCC HTB-38™)	A	10000	>1E6	>1E6
	B	10000	11089	53313

*In vitro cytotoxicity assay was performed by measuring cellular ATP using luciferase-based substrate, CellTiter-Glo® (Promega, Madison, WI)

Serially diluted genetic mutant toxin or *wt* toxin samples were added to the cell monolayers grown in 96-well tissue culture plates. After incubation at 37°C for 72h, the plates were evaluated for metabolically active cells by measuring cellular ATP levels by addition of luciferase based CellTiterGlo® reagent (Promega, Madison, WI) generating luminescence expressed as relative luminescence units (RLUs). High RLUs show that the cells are viable, low RLUs show that the cells are not metabolically active and are dying. The level of cytotoxicity, expressed as EC_{50}, is defined as the amount of *wt* toxin or genetic mutant toxin that elicits a 50% reduction in RLUs compared to levels in cell culture controls (details of this assay are provided below). As shown in Figure 6, Tables 7A, and Table 8A, the EC_{50} values of TcdA and TcdB were about 0.92 ng/mL and 0.009 ng/mL, respectively. The EC_{50} values of triple mutant toxin A and triple mutant toxin B

were about 8600 ng/mL and 74 ng/mL, respectively. Despite an approximate 10,000-fold reduction in cytotoxicity relative to *wt* toxins, both genetic mutant toxins still demonstrated low residual levels of cytotoxicity. This residual cytotoxicity could be blocked by neutralizing antitoxin monoclonal antibodies indicating that it was specific to the triple mutant toxins but not likely related to the known enzymatic activities of the *wt* toxins (glucosylation or autoproteolysis).

Both wt toxins exhibit potent *in vitro* cytotoxicity, with small amounts of the toxins being sufficient to cause various effects on mammalian cells such as cell rounding (cytopathic effect or CPE) and lack of metabolic activity (as measured by ATP levels). Consequently, two *in vitro* assays (a CPE or cell rounding assay and an ATP assay) have been developed to verify that no residual cytotoxicity in the mutant toxin drug substances remains. The results are expressed as EC_{50}, which is the amount of toxin or mutant toxin that causes 1) 50% of the cells to develop CPE or 2) 50% reduction in ATP levels as measured in relative light units.

In the CPE assay, a sample of drug substance is serially diluted and incubated with IMR90 cells, which are observed for a potential cytopathic effect. The CPE assay is scored on a scale of 0 (normal cells) to 4 (~100 % cell rounding) and a score of 2 (~50% cell rounding) is defined as EC_{50} value of the test sample. This method is used for testing of mutant toxin drug substance at the concentration of 1000 µg /mL, which is the maximal tolerable concentration that can be tested in this assay without matrix interference. Consequently, no detectable cytotoxicity is reported as EC_{50} >1000 µg/ml.

The ATP assay is based on measurement of the amount of luminescence signal generated from ATP, which is proportional to the number of metabolically active cells. The maximal tolerable concentration that can be tested in this assay without assay interference is about 200 µg/mL. Therefore no detectable cytotoxity in this assay is reported as EC_{50} >200 µg/mL.

Different concentrations of mutant toxin A and B were added to cells in parallel with toxin controls. The endpoints of the assay were cell viability determined by cellular ATP levels using the CellTiter-Glo® (Promega). The degree of luminescence is proportional to ATP levels or viable cell number.

The *in vitro* cytotoxicity (EC_{50}) of wild type (wt) toxin A was 920 pg/mL and 9 pg/mL for toxin B. The *in vitro* cytotoxicity (EC_{50}) of mutant toxin A (SEQ ID NO: 4) was 8600 ng/mL and 74 ng/mL for mutant toxin B (SEQ ID NO: 6). Although these values represent reductions of 9348 and 8222-fold, respectively, residual cytotoxicity was detected in both mutant toxins.

In other words, the cytotoxicity of triple mutant toxins A and B (SEQ ID NOs: 4 and 6, respectively) was significantly reduced in the *in vitro* cytotoxicity assay in IMR-90 cells relative to the cytotoxicity of wt toxins A and B (SEQ ID NOs: 1 and 2, respectively). As illustrated in Figure 6, although both triple mutant toxins exhibited significant reduction in cytotoxicity (10^4 fold) relative to the wt toxin, residual cytotoxicity was observed at higher concentrations of both triple mutant toxins.

Furthermore, the residual cytotoxicity of each triple mutant toxin could be completely neutralized (e.g., at least a 6-8 $\log_{10}$ reduction in toxicity, relative to the wild-type toxin toxicity) by the toxin specific antibodies. See Example 16, below.

Cell culture assays are more sensitive for detection of cytotoxicity than *in vivo* animal models. When delivered by either i.p. or i.v routes in the mouse lethal challenge model, the *wt* TcdA has an LD_{50} of ~50 ng per mouse while the *wt* TcdB is more potent with an LD_{50} of ~5 ng per mouse. In contrast, the cell culture based *in vitro* assays described above have EC_{50} values of 100 pg per well for *wt* TcdA and 2 pg per well for *wt* TcdB.

Example 15: Residual Cytotoxicity of the Genetic Hepta Mutant Toxin B (SEQ ID NO: 8), and Cytotoxicity of Penta Mutant Toxin B (SEQ ID NO: 184)

As illustrated in Figure 7, the EC_{50} values are similar for the triple mutant toxin B (SEQ ID NO: 6) (20.78 ng/mL) and hepta mutant toxin B (SEQ ID NO: 8) (35.9 ng/mL) mutants indicating that the four additional mutations to further modify the glucosyltransferase active site and GTPase substrate binding site did not further reduce the cytotoxicity of the genetic mutant toxins. The EC_{50} values were also similar for the double mutant toxin B (SEQ ID NO: 5) as they are for the triple and hepta mutant toxins (data not shown). This observation suggests the mechanism for cytotoxicity of the mutant toxins is surprisingly independent of the glucosyltransferase and substrate recognition mechanism.

The penta mutant toxin B (SEQ ID NO: 184) was evaluated for its cytotoxicity by an *in vitro* ATP cytotoxicity assay in IMR90 cells, as described above. See, e.g., Example 14. As shown in Figure 26, the cytotoxicity of the penta mutant toxin B was greatly reduced, as compared to the wild-type toxin B (e.g., SEQ ID NO: 2), which was obtained commercially from List Biologicals), and as compared to the triple mutant toxin B (SEQ ID NO: 86). The "cells only" control relates to IMR-90 cells. See Table 62 below, showing the respective EC_{50} values.

Table 62

Sample	**EC_{50}**	**Fold-reduction in EC_{50}**
Penta Mutant B (lysate concentrate)	11.5 µg/mL	1,642,857
Triple Mutant B (Purified)	18.9 ng/mL	2700
List Toxin B lot127902-115	7.0 pg/mL	1

Moreover, the penta mutant toxin B ("PM-B")(SEQ ID NO: 184) was assessed for competitive inhibition of cytotoxicity that is mediated by the triple mutant toxin B (SEQ ID NO: 86) on IMR-90 cells. See Figure 27. To prepare the samples, the triple mutant toxin B (TM B)(SEQ ID NO: 86) was kept at a constant concentration of 200 ng/mL (10 x EC_{50}) in all wells. A 2-fold serially diluted penta mutant toxin B starting at 5 µg/mL was added to the wells containing the triple mutant toxin B. The samples were then transferred to a 96-well plate containing IMR-90 cells, then incubated for 72 hours. An ATP assay was completed, as described above, e.g., in Example 14. As can be shown

in Figure 27, the penta mutant toxin B competitively inhibited cytotoxicity of the triple mutant toxin B.

Example 16: Residual Cytotoxicity of Triple Mutant Toxins A and B (SEQ ID NOs: 4 and 6, respectively)

To further evaluate the nature of the residual cytotoxicity, the mutant toxins (SEQ ID NOs: 4 and 6) were mixed and incubated with their respective neutralizing antibodies before and the mixture was added to IMR90 cell monolayer.

The results (Figure 8) showed that the residual cytotoxicity of mutant toxin A and B (SEQ ID NOs: 4 and 6, respectively) can be completely abrogated with neutralizing antibodies specific for mutant toxin A (top panel, Figure 8) and mutant toxin B (bottom panel, Figure 8). Increasing concentrations of mutant toxin A (top panel) and B (bottom panel) were incubated with rabbit anti-toxin polyclonal (pAb, 1:10 dilution) or murine monoclonal antibodies (1:50 dilution from a stock containing 3.0 mg IgG/mL) before adding to IMR90 cells. After 72-hr treatment incubation with IMR90 cells at 37°C, CellTiter-Glo® substrate was added and the relative light units (RLU) were measured in a spectrophotometer with the luminescence program to measure ATP levels. The lower the ATP level, the higher the toxicity. Controls included TcdA and TcdB added at 4 times their corresponding EC_{50} values.

Published reports suggest that mutations in the glucosyltransferase or autocatalytic protease domain of the toxins result in complete inactivation of the toxicity. However, our data do not agree with these published reports and this could be attributed to increased concentrations of the highly purified mutant toxins tested in our studies as opposed to crude culture lysates in published reports; increased time points at which cell rounding of mutant toxin-treated cells was observed (e.g., 24 hours, 48 hours, 72 hours, or 96 hours) as opposed to observations made in less than 12 hours; use of cell lines that exhibit significantly higher sensitivities to toxins in present cytotoxicity assays in contrast to HT-29 human colorectal adenocarcinoma cells in cytotoxicity assays disclosed in published reports; and/or to an unknown activity or process, other than glycosylation, that could be driving the residual toxicity of the mutant toxins.

Example 17: Novel Mechanism of Cytotoxicity of Genetic Mutant Toxins

To investigate the mechanism of residual cytotoxicity of the genetic mutant toxins, IMR-90 cells were treated with wt toxin B (SEQ ID NO: 2) or genetic mutant toxin B (SEQ ID NO: 6), and glucosylation of Rac1 GTPase was studied with time of treatment. Samples were collected from 24 to 96 hours and cell extracts were prepared. Glucosylated Rac1 is distinguished from non-glucosylated Rac1 by western blots with two antibodies to Rac1. One antibody recognizes both forms of Rac1 (23A8) and the other (102) only recognizes non-glucosylated Rac1. As illustrated in Figure 22, for toxin B, the total Rac1 levels stayed unchanged over time with majority of the Rac1 being glucosylated. Treatment with the genetic mutant toxin B (SEQ ID NO: 6), on the other hand, resulted in significant reduction of total Rac1, however, the Rac1 was non-glucosylated at all time points. This shows that Rac1 level was negatively affected by the treatment with the genetic mutant toxin, but not by wt toxin. As illustrated in Figure 22, the level of actin was similar in toxin and genetic mutant toxin B treated cells and similar to mock treated cells at indicated time points. This showed that the genetic mutant toxins exerted cytotoxicity by a mechanism which is different than the wild-type toxin-driven glucosylation pathway.

Example 18: Chemical treatment of genetic mutant toxins

Although the genetically modified mutant toxins showed a 4-log reduction in cytotoxic activity is preferred, further reduction (2 to 4 logs) in cytotoxic activity was considered. Two chemical inactivation strategies have been evaluated.

The first method uses formaldehyde and glycine to inactivate the mutant toxins. Formaldehyde inactivation occurs by forming a Schiff base (imine) between formaldehyde and primary amines on the protein. The Schiff bases can then react with a number of amino acid residues (Arg, His, Trp, Tyr, Gln, Asn) to form either intra- or intermolecular crosslinks. This crosslinking fixates the structure of the protein rendering it inactive. In addition, formaldehyde can react with glycine to from a Schiff base. The glycyl Schiff base can then react with the amino acid residues to form intermolecular protein-glycine crosslinks. Formaldehyde reduced the cytotoxic activity of the genetic mutant toxins to below detectable limits (reduction in cytotoxicity >8 $\log_{10}$ for triple mutant B (SEQ ID NO: 6) and >6 $\log_{10}$ for triple mutant A (SEQ ID NO: 4). However, reversion was observed over time when the formaldehyde-inactivated (FI) triple mutant toxins were incubated at 25°C. The cytotoxic reversion can be prevented by addition of a low amount of formaldehyde (0.01-0.02%) into the FI-triple mutant toxins storage solution. See Example 23.

Another method uses 1-ethyl-3-(3-dimethylaminopropyl) carbodiimide (EDC)/N-hydroxysuccinimide (NHS) treatment to generate inactivated mutant toxins. In this method, EDC/NHS reacts with carboxylic groups on the protein to form activated esters. The activated esters can then react with primary amines on the protein to form stable amide bonds. As with the formaldehyde reaction, this reaction results in intra- and intermolecular crosslinks. The amide bond formed by treatment with EDC/NHS is more stable and non-reversible than the labile imine bond formed by formalin inactivation. In addition to crosslinks formed by the reaction of activated esters with primary amines on the polypeptide, both glycine and beta-alanine adducts can be formed. Without being bound by mechanism or theory, glycine adducts are produced when glycine is added to quench unreacted activated esters. The amine of glycine reacts with the activated ester on the polypeptide to form stable amide bonds. Without being bound by mechanism or theory, beta-alanine adducts are formed by the reaction of activated beta-alanine with primary amines on the polypeptide. This reaction results in stable amide bonds.

Activated beta-alanine is produced by the reaction of three moles of NHS with one mole of EDC.

To achieve the 2-4 logs reduction of cytotoxic activity relative to the genetically modified mutant toxins (6-8 logs, relative to native toxins), the chemically inactivated mutant toxins should have EC_{50} values of ≥1000 µg/mL. In addition to reduction in cytotoxic activity, it would be advantageous to retain key epitopes as determined by dot-blot analysis. To date, a number of reaction conditions have been identified that meet both the reduction cytotoxicity and epitope recognition criteria. Several batches of inactivated mutant toxins have been prepared for animal studies and analytical data from a few representative batches is shown in Tables 7A and 7B, Table 8A and 8B.

Table 7A: Chemically Inactivated Mutant Toxin A is Safe and Antigenic

Sample #	Toxin Sample ID	Treatment	CPE EC_{50} µg/mL	Reduction in toxicity Log Scale	Reactivities to mAbs
1	Mutant TcdA (SEQ ID NO: 4) L44905-160A	Formalin	>1000	6.4	Medium/high
2	Mutant TcdA (SEQ ID NO: 4) L44166-166	EDC	>1000	6.4	High
3	Mutant TcdA (SEQ ID NO: 4) L44905-170A	Formalin	>1000	6.4	Low
CONTROLS					
4	TcdA wt (from List Bio)	none	390 pg/mL	1	High
5	TcdB wt (from List Bio)	none	3.90 pg/mL	Not applicable	None
6	rMutant TcdA TM Genetic L36901-79 (SEQ ID NO: 4)	none	12.5 µg/mL	4.5	High
7	Toxoid A List Bio	Formalin	Not Done	---	Low

Table 7B: Chemically inactivated Mutant Toxin A is Safe and Antigenic								
Sample #	Toxin Sample ID	Treatment	Reactivity with mAb (dot blot, nondenaturing conditions)					
			N-terminal mAb#6	Mid-Domain mAb # 102	C-terminal (neut)			
					A80-29	A3-25	A60-22	A65-33
1	Mutant TcdA (SEQ ID NO: 4) L44905-160A	Formalin	++	++	++++	++	++++	++++
2	Mutant TcdA (SEQ ID NO: 4) L44166-166	EDC	++++	++++	++++	++++	++++	++++
3	Mutant TcdA (SEQ ID NO: 4) L44905-170A	Formalin	+	+	++	++	++	+
CONTROLS								
4	TcdA wt (from List Bio)	none	++++	+++	++++	++++	++++	++++
5	TcdB wt (from List Bio)	none	—	—	—	—	—	—
6	rMutant TcdA TM Genetic L36901-79 (SEQ ID NO: 4)	none	++++	++++	++++	++++	++++	++++
7	Toxoid A List Bio	Formalin	—	—	+	—	++	+

List =List Biologicals; CPE= cytopathic effect assay; EC_{50} = the lowest concentration where 50% of the cells show cytotoxicity; mAbs= monoclonal antibodies; neut= neutralizing; ND= not done; TM= active site and cleavage mutant ("triple mutant")

Table 8A: Chemically Inactivated Mutant Toxin B is Safe and Antigenic					
Sample #	Toxin Sample ID	Treatment	CPE EC_{50} µg/mL	Reduction in toxicity Log Scale	Reactivities to mAbs
1	Mutant TcdB L44905-182 (SEQ ID NO: 6)	Formalin	>1000	8.4	Medium/high
2	Mutant TcdB L34346-38A (SEQ ID NO: 6)	EDC	>1000	8.4	High
3	Mutant TcdB L44905-170B (SEQ ID NO: 6)	Formalin	>1000	8.4	Low
CONTROLS					
4	Tcda wt (from List Bio)	none	390 pg/mL	Not applicable	None
5	TcdB wt (from List Bio)	none	3.90 pg/mL	1	High
6	rMutant toxin B TM Genetic (SEQ ID NO: 6) L34346-022	none	69 ng/mL	4.2	High
7	Toxoid A List	Formalin	Not done	---	Medium

Table 8B: Chemically Inactivated Mutant Toxin B is Safe and Antigenic						
Sample #	Toxin Sample ID	Treatment	Reactivity with mAb (dot blot, nondenaturing conditions)			
			N-terminal aa 1-543		Mid-/C-terminal aa 544-2366	
			B8-26	B9-30	B56-6	B59-3
1	Mutant TcdB (SEQ ID NO: 6) L44905-160A	Formalin	+++	+++	++	++
2	Mutant TcdB (SEQ ID NO: 6) L44166-166	EDC	++++	++++	++++	++++
3	Mutant TcdB (SEQ ID NO: 6) L44905-170A	Formalin	++	+	+/-	-
CONTROLS						
4	TcdA wt (from List Bio)	none	—	—	—	—
5	TcdB wt (from List Bio)	none	++++	+++	++++	++++
6	rMutant TcdB TM Genetic L34346-022 (SEQ ID NO: 6)	none	++++	++++	++++	++++
7	Toxoid B List	Formalin	+++	+++	+++	+++

List =List Biologicals; CPE= cytopathic effect assay; EC_{50} = the concentration where 50% of the cells show cytotoxicity; mAbs= monoclonal antibodies; neut= neutralizing; ND= not done; TM= active site and cleavage mutant ("triple mutant")

Example 19: Fermentation and Purification

Fermentations were initiated from a frozen source of a recombinant *Clostridium difficile* including an *fdx* promoter described above. The frozen stocks were a cell suspension made to an OD_{600}=2.0 and 20% glycerol. A starter culture was inoculated with 0.2 mL of the culture stock into 500mL SHYG10 medium (30 g/L soy hydrolysate SE50MK, 20 g/L yeast extract HY YEST 412, 10 g/L glucose, 15 mg/L thiamphenicol , pH7). The medium was contained in a 500mL vented bottle. The inoculation was performed in a conventional biosafety cabinet, the bottle was flushed with nitrogen, and the bottle was then incubated static (vents closed) for ~ 16-18 hours at 37°C in a conventional incubator.

A ten liter bioreactor containing 8L of SHYG60 medium (30 g/L soy hydrolysate SE50MK, 20 g/L yeast extract HY YEST 412, 60 g/L glucose, 15 mg/L thiamphenicol, pH7) was used for the fermentation phase. The 500mL contents of the inoculum bottle were inoculated to the fermentor which was operated at 37°C, 400 rpm (1.47 m/s) with 0.1 vvm nitrogen sparge. The pH was controlled at 7.0 by auto-addition of 5N NaOH. Fermentation was typically run for ~ 24hours to reach peak potency. Growth during the course of the fermentation was monitored by OD_{600} readings. Samples taken for mutant toxin quantitation were spun at ~5000xg and the resulting pellets were frozen at -70°C. The cell pellet was then defrosted and resuspended in a buffer consisting of 20mM Tris, 3mM NaCl, 0.5 mM EDTA, pH 6.5 and sonicated at an amplitude of 40 for 20 seconds. The resulting cell lysate was spun at 5,000xg for 10 min. The supernatant was combined with loading buffer and reducing agent and run on a 3.8% Tris-acetate PAGE gel at 150 volts for 50-55 min versus authentic toxin standards. The gel was stained overnight, then destained and quantitated on a scanning densitometer. Typically, OD_{600} values of ~ 10-12 were observed with toxin values of 80-120 mg/L.

The following table is an example of fermentation data for mutant toxin A.

Table 63

Elapsed fermentation time (hrs)	OD_{600}	Toxin yield (mg/L)
1	0.32	
3	1.16	
5	3.55	33
7	5.56	53
9	7.11	63
11	8.64	81
24	11.14	123

An example of fermentation data for mutant toxin B is presented in the table below.

Table 64

Elapsed fermentation time (hrs)	OD_{600}	Toxin yield (mg/L)
1	0.73	
3	1.18	
5	4.54	30
7	5.93	40
9	7.05	48
11	8.44	62
24	10.03	94

Modifications of the composition and methods for culturing the recombinant *C. difficile* cell and/or production of the mutant toxins have been tested and are within the scope of the invention. For example, although SE50MK (and variously SE50MK-NK, both sourced from Friesland-Campaigna) was the preferred choice for nitrogen source, a variety of other soy hydrolysates from other manufacturers were identified that worked well in the process. A culture medium including soy hydrolysate in the absence of yeast extract provided 30-40% of the expected yield.

Yeast extracts from alternative manufacturers were shown to support equivalent yields. A culture medium including yeast extract in the absence of soy hydrolysate provided 60-70% of the expected yield.

Use of a culture medium based on soy hydrolysate/yeast extract, in the absence of a carbon source, yieleded about 2-3 OD_{600} and about 10-15 mg/L toxin. Although glucose was a preferred carbon source for culturing, equivalent results were obtained with mannitol. A screen of carbon sources in bottles, indicated that *C. difficile* may also utilize fructose and mannose which would also be expected to support high OD/yield, as compared to a culture medium in the absence of a carbon source. The following carbon sources did not appear to support optimal growth: arabinose, xylose, sucrose, lactose, maltose, glycerol, rhamnose and galactose.

In addition, extending the fermentation time to 48 hours (requiring addition of more glucose) did not appear to substantially improve yield.

Further, fermentation at pH 6.5 and 7.5 gave yields in the expected range of 80-120 mg/L. Fermentation at more extreme pH (pH 6.0 or 8.0) still gave the expected OD_{600} values, but reduced yields (40-60 mg/L) of toxin.

Fermentation using a culture medium in the absence of thiamphenicol resulted in a loss of plasmid, e.g., about 10-20% for a plasmid encoding mutant toxin B, and about 30-40% for a plasmid encoding mutant toxin A. Accordingly, fermentation using a culture medium in the absence of a chloramphenicol derivative was feasible.

Alternative modes of operating fermentation were also tested and are within the scope of the invention. For example, fermentation may be run at 400 rpm or less and nitrogen overlay may be used, both techniques of which were tried and used successfully.

Moreover, a monoclonal antibody medium SFM4MAb was tested and was shown to give about 10 OD_{600} of cells and about 40 mg/L of mutant toxin.

Lastly, addition of a phosphate-containing ingredient to the fermentation appeared to reduce the production of toxin, as compared to culture medium in the absence of the phosphate-containing ingredient.

At the end of fermentation, the fermenter is cooled. The cell slurry is recovered by continuous centrifugation and re-suspended in the appropriate buffer. Lysis of the cell suspension is achieved by high-pressure homogenization. For mutant toxin A, the homogenate is flocculated and the flocculated solution undergoes continuous

centrifugation. This solution is filtered and then transferred for downstream processing. For mutant toxin B, the homogenate is clarified by continuous centrifugation, and then transferred for downstream processing.

Mutant toxin A (SEQ ID NO: 4) is purified using two chromatographic steps followed by a final buffer exchange. The clarified lysate is loaded onto a hydrophobic interaction chromatography (HIC) column and the bound mutant toxin is eluted using a sodium citrate gradient. The product pool from the HIC column is then loaded on a cation exchange (CEX) column and the bound mutant toxin A is eluted using a sodium chloride gradient. The CEX pool containing purified mutant toxin A is exchanged into the final buffer by diafiltration. The purified mutant toxin A is exchanged into the final drug substance intermediate buffer by diafiltration. After diafiltration, the retentate is filtered through a 0.2 micron filter prior to chemically inactivation to a final drug substance. The protein concentration is targeted to 1-3 mg/mL.

Mutant toxin B (SEQ ID NO: 6) is purified using two chromatographic steps followed by a final buffer exchange. The clarified lysate is loaded onto an anion exchange (AEX) column, and the bound mutant toxin is eluted using a sodium chloride gradient. Sodium citrate is added to the product pool from the AEX column and loaded on a hydrophobic interaction chromatography (HIC) column. The bound mutant toxin is eluted using a sodium citrate gradient. The HIC pool containing purified mutant toxin polypeptide (SEQ ID NO: 6) is exchanged into the final buffer by diafiltration . The purified mutant toxin B is exchanged into the final drug substance intermediate buffer by diafiltration. After diafiltration, the retentate is filtered through a 0.2 micron filter prior to chemically inactivation to a final drug substance. The protein concentration is targeted to 1-3 mg/mL.

Example 20: Formaldehyde/Glycine Inactivation

After purification, the genetic mutant toxins A and B (SEQ ID NOs: 4 and 6, respectively) are inactivated for 48 hours at 25°C using 40 mM (1.2 mg/ml) of formaldehyde. The inactivation is carried out at pH 7.0 ± 0.5 in 10 mM phosphate, 150 mM sodium chloride buffer containing 40 mM (3 mg/ml) glycine. The inactivation period is set to exceed three times the period needed for reduction in the EC_{50} in IMR90 cells to greater than 1000 ug/mL. After 48 hours, the biological activity is reduced 7 to 8 log_{10} relative to the native toxin. Following the 48 hour incubation, the inactivated mutant toxin is exchanged into the final drug substance buffer by diafiltration. For example, using a 100 kD regenerated cellulose acetate ultrafiltration cassette, the inactivated toxin is concentrated to 1-2 mg/mL and buffer-exchanged.

Example 21: N-(3-Dimethylaminopropyl)-N'-ethylcarbodiimide (EDC)/N-hydroxysuccinimide (NHS) Inactivation

After purification, the genetic mutant toxins (SEQ ID NO: 4 and SEQ ID NO: 6) are inactivated for 2 hours at 25°C using 0.5 mg EDC and 0.5 mg NHS per mg of purified genetic mutant toxin A and B (approximately 2.6 mM and 4.4 mM respectively). The reaction is quenched by the addition of glycine to a final concentration of 100 mM and the reactions incubate for an additional 2 hours at 25°C. The inactivation is carried out at pH 7.0 ± 0.5 in 10 mM phosphate, 150 mM sodium chloride buffer. The inactivation period is set to exceed three times the period needed for reduction in the EC_{50} in IMR90 cells to greater than 1000 ug/mL. After 2 hours, the biological activity is reduced 7 to 8 $\log_{10}$ relative to the native toxin. Following the 4 hour incubation, the inactivated mutant toxin is exchanged into the final drug substance buffer by diafiltration. For example, using a 100 kD regenerated cellulose acetate ultrafiltration cassette, the inactivated toxin is concentrated to 1-2 mg/mL and buffer-exchanged.

Unless otherwise stated, the following terms as used in the Examples section refer to a composition produced according to the present description in Example 21: "EDC/NHS-treated triple mutant toxin"; "EDC-inactivated mutant toxin"; "mutant toxin [A/B] drug substance"; "EI-mutant toxin"; "EDC/NHS-triple mutant toxin." For example, the following terms are synonymous: "EDC/NHS-treated triple mutant toxin A"; "EDC-inactivated mutant toxin A"; "mutant toxin A drug substance"; "EI-mutant toxin A"; "EDC/NHS-triple mutant toxin A." As another example, the following terms are synonymous: "EDC/NHS-treated triple mutant toxin B"; "EDC-inactivated mutant toxin B"; "mutant toxin B drug substance"; "EI-mutant toxin B"; "EDC/NHS-triple mutant toxin B."

The mutant toxin A drug substance and the mutant toxin B drug substance are each manufactured using a batch process, which includes (1) fermentation of a the toxin negative *C. difficile* strain (VPI 11186) containing a plasmid encoding the respective genetic triple mutant toxin polypeptide (in a medium including soy hydrolysate, yeast extract HY YEST™ 412 (Sheffield Bioscience), glucose, and thiamphenicol), (2) purification of the genetic mutant toxin (the "drug substance intermediate") from the cell-free lysate using ion exchange and hydrophobic interaction chromatographic procedures to at least greater than 95% purity, (3) chemical inactivation by treatment

with EDC/NHS followed by quenching/capping with glycine, and (4) exchange into the final buffer matrix.

Example 22: Studies Supporting Conditions of Inactivation and Formulation

To optimize the chemical inactivation of the genetic mutant toxins, a statistical design of experiment (DOE) was performed. Factors examined in the DOE included temperature, formaldehyde/glycine concentration, EDC/NHS concentration and time (Table 9 and 10). To monitor loss of biological activity, EC_{50} values in IMR90 cells were determined. In addition, cell morphology of IMR-90 cells various timepoints post-treatment were also observed. See Figure 9, showing morphology at 72 hours post treatment. To determine the effect on protein structure, epitope recognition was monitored using dot-blot analysis using a panel of monoclonal antibodies raised against different domains of the toxin.

Table 9: Parameters Tested Formaldehyde/Glycine DOE

Parameters	Range tested
Time (days)	1 to 14
Temperature (°C)	4 to 37
Toxin concentration (mg/ml)	1 to 1.25
Formaldehyde concentration (mM)	2 to 80
Glycine concentration (mg/ml)	0 to 80

Table 10: Parameters Tested EDC/NHS DOE

Parameters	Range tested
Time (hours)	1 to 4
Temperature (°C)	25 to 35
Toxin concentration (mg/ml)	1 to 1.25
EDC (mg/mg toxin)	0.25 to 2.5
NHS (mg/mg toxin)	0 to 2.5

In the formaldehyde/glycine inactivation of *C. difficile* mutant toxins, final reaction conditions were chosen such that the desired level of reduction in cytotoxic activity (7 to 8 $\log_{10}$) was achieved while maximizing epitope recognition. See Example 20 above.

In the EDC/NHS inactivation of *C. difficile* mutant toxins, final reaction conditions were chosen such that the desired level of reduction in cytotoxic activity (7 to 8 $\log_{10}$) was achieved while maximizing epitope recognition. See Example 21 above.

In an alternative embodiment, the EDC-NHS reaction was quenched by addition of alanine, which sufficiently quenched the reaction. Use of alanine may result in a modification on the mutant toxin protein that is similar to the modification when the reaction is quenched by glycine. For example, quenching by adding alanine may result in an alanine moiety on a side chain of a glutamic acid and/or aspartic acid residue of the mutant toxin. In another alternative embodiment, the EDC-NHS reaction was quenched by addition of glycine methyl ester, which sufficiently quenched the reaction.

Production of chemically inactive triple mutant *C. difficile* toxin A and toxin B under optimized conditions resulted in a further reduction of residual cytotoxicity to an undetectable level (>1000 µg/mL - the highest concentration tested via the CPE assay), while retaining antigenicity as measured by their reactivity to the toxin-specific neutralizing antibodies. The results shown in Table 28 demonstrate a stepwise reduction in cytotoxicity from wt toxin through to EDC/NHS-treated triple mutant toxins. Immunofluorescence labelling confirmed that triple mutant toxins (SEQ ID NO: 4 and 6) and mutant toxin drug substances exhibited comparable binding to the IMR-90 cells suggesting that the cytotoxicity loss was not due to reduced binding to the cells (data not shown). Compared to mutant toxin A drug substance, the mutant toxin B drug substance achieved higher fold-reduction in cytotoxicity, which is consistent with the observed ~600-fold higher potency of TcdB compared to TcdA.

Table 28. Cytotoxicity Summary

Toxin	**Sample**	**EC_{50}**	**Fold reduction in cytotoxicity**
A	TcdA (SEQ ID NO: 1)	1.6 ng/mL	1
	Triple mutant toxin A (SEQ ID NO: 4)	12.5 µg/mL	7800
	Mutant toxin A Drug Substance	>1000 µg/mL	>625,000
B	TcdB (SEQ ID NO: 2)	2.5 pg/mL	1
	Triple mutant toxin B (SEQ ID NO: 6)	45 ng/mL	18,000
	Mutant toxin B Drug Substance	>1000 µg/mL	>400,000,000

Cytotoxicity assay results for mutant toxin B modified by EDC alone, or by EDC and sulfo-NHS were also assessed. See Table 29.

Table 29

Sample	Cytotoxicity EC_{50}, $mg.mL^{-1}$ (CPE)	Comment
TcdB TM (SEQ ID NO: 6), unmodified	0.03	
TM TcdB-EDC 1, no NHS	<0.97	Reacted with EDC alone
TM TcdB-EDC 2, no NHS	<0.97	Duplicate preparation
TM TcdB-EDC 3, sulfo-NHS (0.5x)	125	Reacted with EDC and sulfo-NHS
TM TcdB-EDC 4, sulfo-NHS (0.5x)	125	Duplicate preparation
TM TcdB-EDC 3, sulfo-NHS (1.0x)	250	Reacted with EDC and sulfo-NHS
TM TcdB-EDC 4, sulfo-NHS (2.0x)	750	Reacted with EDC and sulfo-NHS

Conditions: Triple mutant toxin B ("TM TcdB")(SEQ ID NO: 6) was modified in the weight ratios mutant toxin B:EDC:sulfo-NHS = 1: 0.5: 0.94. This ratio is the molar equivalent (corrected for higher MW of sulfo-NHS) to the standard EDC/NHS reaction as described in Example 21. To determine the affect of sulfo-NHS, the sulfo-NHS ratio was varied from 0.5x to 2x the standard ratio. Duplicate reactions were performed in 1 x PBS pH 7.0 at 25 °C, and were initiated by addition of EDC solution. After 2 hours, reactions were quenched by the addition of 1 M glycine pH 7.0 (0.1 M final concentration) and incubated for a further 2 hours. Quenched reactions were desalted and mutant toxin B drug substance ("TM TcdB-EDC") was concentrated using Vivaspin 20 devices, and sterile filtered into sterile vials and submitted for assessment in a cytotoxicity assay.

At the same molar ratio, sulfo-NHS reduced the EC_{50} to about 250 ug/mL as compared to >1000 ug/mL for NHS. Even at twice the molar ratio, sulfo-NHS does not appear not as effective as NHS in decreasing cytotoxicity. See Table 30.

Table 30

Modification	reference Digest (TcdB EDC 004)	NHS control digest (TcdB EDC 001)	Sulfo-NHS Sample Digest
glycine adduct (+57 da)	49	29	35
beta-alanine (+71 da)	24	19	0
crosslinks (-18 da)	7	4	3
dehydroalanine (-34 da)	6	5	4
Unmodified	273	195	217

To determine the number and type of modifications, peptide mapping was performed on both EDC/NHS and EDC/sulfo-NHS inactivated triple mutant toxin B samples. Similar amounts of glycine adducts, crosslinks and dehydroalanine modifications were observed in both samples. However in the sulfo-NHS sample, no beta-alanine was observed.

Wild-type toxin B (SEQ ID NO: 2) was inactivated using the standard protocol (see Example 21); toxin B:EDC:NHS 1:0.5:0.5, 25°C for 2 hours in 1 x PBS pH 7.0, then quench with 1 M glycine (0.1 M final concentration) and incubate for an additional 2 hours. The sample was desalted, concentrated and submitted for cytotoxicity assay. The EC_{50} for this samples was <244 ng/mL.

Example 23: Reversion Studies

To determine if reversion occurs with either the formaldehyde/glycine or EDC/NHS inactivated *C. difficile* mutant toxins, samples of inactivated mutant toxins (1 mg/mL) were incubated at 25ºC for five-six weeks. Aliquots were removed each week and the EC_{50} values in IMR90 cells were determined. One formaldehyde/glycine inactivated sample contained no formaldehyde and one sample contained 0.01% formaldehyde. The EC_{50} was measured by the CPE assay.

Table 11: Results from Inactivated TcdA Reversion Study

Time of Incubation (Days)	EC_{50} (IMR90 cell assay)		
	Formalin-inactivated		EDC/NHS
	No formaldehyde	0.01% formaldehyde	
0	1000 ug/ml	1000 ug/ml	1000 ug/ml
7	740 ug/mL	ND	1000 ug/ml
14	493 ug/mL	1000 ug/ml	1000 ug/ml
21	395 ug/mL	ND	1000 ug/ml
28	395 ug/mL	1000 ug/ml	1000 ug/ml
35	326 ug/M	ND	ND

At 25ºC in the absence of residual formaldehyde, partial reversion is observed (Table 11). After five weeks, the cytotoxic activity increased approximately 3-fold. Although the cytotoxic activity increased, after five weeks there was still a 7 log_{10} reduction relative to the native toxin. Reversion was completely prevented by inclusion of formalin at a concentration of 0.010%. No reversion was observed in the EDC/NHS inactivated sample. Throughout the 6-week incubation, EC_{50} values remained at the starting level of >1000 µg/mL for all four lots of both EDC/NHS-treated triple mutant toxin A (SEQ ID NO: 4) and EDC/NHS-treated triple mutant toxin B (SEQ ID NO: 6). In contrast, the EC_{50} values of FI-treated triple mutant toxin A (SEQ ID NO: 4) and FI-treated triple mutant toxin B (SEQ ID NO: 6) were not stable and declined to unacceptably low EC_{50} values, indicating an increase in cytotoxicity or reversion of inactivation. See Table 11.

In addition to stably reducing the cytotoxicity to an undetectable level (>1000 µg/mL, as measured by the CPE assay), mutant toxins inactivated using EDC/NHS retained important epitopes that are targets of toxin-neutralizing mAbs. See Table 31 . FI mutant toxins showed a loss of the same antigenic determinants.

Table 31. EDC/NHS Inactivation Reduced Cytotoxicity of Genetic Mutant Toxins and Maintained Important Antigenic Determinants

Sample	EC_{50}	Reduction in cytotoxicity relative to wt toxin (log_{10})[a]	Max binding (Rmax)[b] Neut mAb[d]		
			1[c]	2	3
Triple mutant A (SEQ ID NO: 4)	12.5 µg/mL	4.5	100	100	100
FI- Triple mutant A	>1000 µg/mL	>6.4	55	59	53
EDC/NHS- Triple mutant A	>1000 µg/mL	>6.4	90	94	103
Triple mutant B (SEQ ID NO: 6)	69 ng/mL	4.3	100	100	100
FI-Triple mutant B	>1000 µg/mL	8.4	67	67	36
EDC/NHS-Triple mutant B	>1000 µg/mL	8.4	87	78	73

a cytotoxicity was measured using the CPE assay on IMR90 cells

b values determined by Biacore™ analysis using multiple neutralizing mAbs directed at various non-overlapping toxin epitopes

c values are averages of two experiments

d For the first three rows, the neut mAb "1," "2," "3" refer to mAbs A60-22, A80-29, and A65-33 for toxin A, respectively. For the bottom three rows, the neut mAb "1," "2," "3" refer to mAbs B8-26, B59-3, and B-56-15 for toxin B, respectively.

Example 24: Preclinical Immunogenicity Studies

Key preclinical objectives include testing compositions including *C. difficile* mutant toxins A and B in small animals and nonhuman primates (NHP). Mice and hamsters were immunized to determine, among other things, if the *C. difficile* compositions are capable of eliciting neutralizing antibodies against the mutant toxin A and B. The antigens were tested for induction of serum neutralization antibody responses following a series of immunizations in mice, hamsters, and cynomolgus macaques. The genetic and/or chemically-inactivated mutant toxins were formulated in either neutral buffer, aluminum phosphate buffer, or buffer containing ISCOMATRIX as an adjuvant in some embodiments. Neutralizing antibody responses were generally tested about two to four weeks after each boost or the final dose.

The toxin neutralization assay demonstrates the ability of an antiserum to neutralize the cytotoxic effect mediated by *C. difficile* TcdA or TcdB and is therefore able to measure the functional activity of antibodies that are present in a sample. A toxin neutralization assay was performed on a human lung fibroblast cell line, IMR-90, which is sensitive to both TcdA and TcdB. Briefly, a 96-well microtiter plate was seeded with IMR-90 cells serving as the target of toxin-mediated cytotoxicity. Each test serum sample was analyzed separately for the ability to neutralize TcdA and TcdB. Appropriate serial dilutions of test antisera were mixed with a fixed concentrations of TcdA or TcdB and incubated at 37ºC for 90 minutes in a humidified incubator (37ºC /5% CO_2) to allow for neutralization of the toxins to occur. For quality control, all plates included a Reference standard and controls which includes antitoxin antibodies of known titer. After 90 minutes, the toxin-antisera mixture was added to the IMR-90 cell monolayer and the plates were incubated for an additional 72 hours. Subsequently, CellTiter-Glo® substrate was added to the assay plate to determine the Adenosine Triphosphate (ATP) levels present in metabolically active cells and was measured as Relative Luminescence Units (RLU). A large ATP level indicates high cell viability, and levels are directly proportional to the amount of neutralization of the toxin by the antibody present in the sample. For preclinical data, the RLU data was plotted against the dilution value of the test antisera sample to generate a Four-Parameter Logistic (4-PL) regression response fit curve. The neutralization titers were expressed as the sample dilution value which exhibited 50% reduction in cytotoxicity.

Example 25: Mouse immunogenicity study: mu*C. difficile*2010-06

The purpose of this study was to assess the immunogenicity of two forms of mutant *C. difficile* toxin B (SEQ ID NO: 6), each chemically-inactivated by different methods. In this study, the untreated mutant toxin B (SEQ ID NO: 6) (genetically inactivated but not chemically inactivated) was used as a control, with and without adjuvant.

Groups of 10 mice were immunized intramuscularly with 10 µg of an immunogen according to Table 12.

Table 12. Testing chemically inactivated mutant toxin B (SEQ ID NO: 6) in mice

Group	Immunogen	Dose	No.	Route	Schedule
1	Formalin-Inactivated Mutant toxin B[a] in $AlPO_4$ [c]	10 µg	10	IM	Prime wk 0, Boost wks 4, 8
2	Inactivated Mutant toxin B form 2[b] in $AlPO_4$ [c]	10 µg	10	IM	Prime wk 0, Boost wks 4, 8
3	Genetic-Inactivated Mutant toxin B unadjuvanted	10 µg	10	IM	Prime wk 0, Boost wks 4, 8,
4	Genetic-Inactivated Mutant toxin B in $AlPO_4$ [c]	10 µg	10	IM	Prime wk 0, Boost wks 4, 8,

[a] chemical inactivation = Formalin/glycine treated 10^{O}C for 7 days

[b] chemical inactivation = EDC/NHS treated, 30^{O}C for 2 hours

[c] aluminum ion concentration = 0.5 mg/mL

Results: There were no adverse events in the mice following each administration of the vaccine candidates. As illustrated in Figure 10, mice in each group developed significant robust anti-toxin B neutralizing antibodies after the third dose with the respective mutant toxins.

Based on the week 12 titers, it appears that in mice the EDC-inactivated mutant toxin B (Group 2) and the formalin-inactivated mutant toxins (Group 1) generated potent neutralizing responses.

In the absence of chemical inactivation, the genetic mutant toxin B (SEQ ID NO: 6) generated neutralizing responses after two doses (Groups 3-4, week 8), which were boosted after the third dose (Groups 3-4, week 12).

5

Example 26: Mouse immunogenicity study: mu*C. difficile*2010-07:

The purpose of this study was to assess immunogenicity of chemically inactivated *C. difficile* mutant toxins A and B (SEQ ID NOs: 4 and 6, respectively), either alone or in combination. The immunogens for all groups were formulated with aluminum phosphate as an adjuvant.

Groups of 5 mice were immunized intramuscularly with 10 µg of an immunogen according to Table 13.

Table 13. Testing Chemically Inactivated Genetic A and B mutant toxins (SEQ ID NOs: 4 and 6, respectively) in Mice

Group	Immunogen	Dose	No.	Group	Schedule
1	Formalin-Inactivated[a] Mutant toxin B (SEQ ID NO: 6) in $AlPO_4$[c]	10 µg	5	IM	Prime wk 0, Boost wks 4, 8, 12
2	EDC-Inactivated[b] Mutant toxin B (SEQ ID NO: 6) in $AlPO_4$[c]	10 µg	5	IM	Prime wk 0, Boost wks 4, 8, 12
3	Formalin-Inactivated Mutant toxin A (SEQ ID NO: 4) form 1 in $AlPO_4$[c]	10 µg	5	IM	Prime wk 0, Boost wks 4, 8, 12
4	EDC-Inactivated Mutant toxin A (SEQ ID NO: 4) in $AlPO_4$[c]	10 µg	5	IM	Prime wk 0, Boost wks 4, 8, 12
5	Formalin-Inactivated Mutant toxins A+B in $AlPO_4$[c]	10 µg each	5	IM	Prime wk 0, Boost wks 4, 8, 12

[a] Formalin-treatment = formalin/glycine treated for 2 days at 25°C; mutant toxin was not cytotoxic and retained binding to all mutant toxin-specific monoclonal antibodies tested

[b] EDC-treatment = EDC/NHS treated for 4hrs at 30°C; mutant toxin was not cytotoxic and retained binding to all mutant toxin-specific monoclonal antibodies tested

[c] aluminum ion concentration = 0.5 mg/mL

Results: There were no adverse events in the mice following each administration of the vaccine candidates. As illustrated in Figure 11, after two doses of chemically inactivated genetic mutant toxins, the anti-toxin A neutralizing antibodies (Groups 3-5) were boosted to titers between 3 and $4\log_{10}$ while the anti-toxin B neutralizing antibodies (Groups 1-2, 5) remained low to undetectable, which is consistent with the data from the mouse study described above (Figure 10). Anti-toxin B neutralizing antibodies boosted to 2-3 $\log_{10}$ in groups 1, 2, and 5 following the third dose (week 12 titers) and reached their peak two weeks following the fourth dose (week 14 titers). The anti-toxin A neutralizing antibody titers in groups 3-5 increased slightly following the third (week 12 titers) and fourth immunizations (week 14 titers).

Example 27: Hamster immunogenicity study: ham*C. difficile*2010-02:

The purpose of this study was to assess immunogenicity and protective potential of *C. difficile* triple mutant and chemically inactivated mutant toxins A and B in the Syrian golden hamster model. The Syrian golden hamster model represents the best available challenge model for simulating human CDAD. The same batches of mutant toxins A and B used in mouse study mu*C. difficile*2010-07 were used in this study. As a control, one group was given mutant toxins without aluminum-containing adjuvant.

Groups of 5 Syrian golden hamsters were immunized intramuscularly with 10 µg of an immunogen according to Table 14.

Table 14. Testing Chemically Inactivated Mutant Toxins A and B (SEQ ID NOs: 4 and 6, respectively) in Hamsters (ham*C. difficile*2010-02)

Group	Immunogen	Dose	No.	Route	Schedule
1	Formalin-Inactivated[a] Mutant toxins A+B (SEQ ID NOs: 4 and 6) in $AlPO_4$[c]	10 µg each	5	IM	Prime wk 0, Boost wks 4, 8, 12
2	Formalin-Inactivated Mutant toxins A+B (SEQ ID NOs: 4 and 6) in PBS (no adjuvant)	10 µg each	5	IM	Prime wk 0, Boost wks 4, 8, 12
3	EDC-Inactivated[b] Mutant toxins A+B (SEQ ID NOs: 4 and 6) in $AlPO_4$[c]	10 µg each	5	IM	Prime wk 0, Boost wks 4, 8, 12
4	List Biological toxoid in $AlPO_4$[c]	10 µg each	5	IM	Prime wk 0, Boost wks 4, 8, 12

[a] Formalin-treatment = formalin/glycine treated for 2 days at 25°C; Mutant toxin was not cytotoxic and retained binding to all mutant toxin-specific monoclonal antibodies tested
[b] EDC-treatment = EDC/NHS treated for 4hrs at 30°C; Mutant toxin was not cytotoxic and retained binding to all mutant toxin-specific monoclonal antibodies tested
[c] aluminum ion concentration = 0.5 mg/mL

1. Animals: 15 Syrian golden hamsters, female, 6-8 weeks old/ 100-130g each.
2. Vaccination: IM, 0.05 ml each, according to above schedule. Toxoids will be provided by Process Development and will be formulated in AlPO4 diluent by the Formulations Group. Group 2 will serve as a non-adjuvanted control group.
3. Bleed: All hamsters will be bled at weeks 0, 4, 8, and 12, just prior to each immunization.
4. Serum sample analysis: Neutralization assay

Results: There were no adverse events observed following immunization with the mutant toxins. As illustrated in Figure 12, after a single dose of mutant toxins, the anti-toxin A neutralizing responses were between 2-3 $\log_{10}$ for the formalin-inactivated mutant toxins (Groups 1-2) and between 3-4 $\log_{10}$ for the EDC-inactivated mutant toxins (Group 3). After the second dose, anti-toxin A antibodies boosted in all three groups. Anti-toxin A antibodies in all three groups did not appear to increase after the third dose. A similar result was observed after the fourth immunization, where an increase in titer was observed in the formalin-inactivated group that did not contain the aluminum adjuvant (Group 2).

The anti-toxin B neutralizing responses were undetectable in the formalin-inactivated mutant toxins groups (Groups 1-2) and were just over 2 $\log_{10}$ for the EDC-inactivated mutant toxins (Group 3) after a single dose. After the second dose, anti-toxin B neutralizing antibody titers in the two formalin-inactivated groups (Groups 1-2) increased to 3-4$\log_{10}$ while those in the EDC-inactivated group (Group 3) increased to 4-5 $\log_{10}$. For all three groups, increases in anti-toxin B neutralizing antibody titers were observed after the third and/or fourth doses, with all groups reaching a peak titer at week 16 (after the last dose). See Figure 12.

In Figure 13, the level of neutralizing antibody responses against chemically inactivated genetic mutant toxins (Figure 12) was compared to those elicited by List Biological Laboratories, Inc. (Campbell, California) (also referred herein as "List Bio" or "List Biologicals") toxoids (i.e., toxoids purchased from List Biological Laboratories were prepared by formalin inactivation of wild type toxins; control reagent used to establish the hamster challenge model).

As used herein, "FI" in figures and tables refers to formalin/glycine treatment of the toxins, 2 days at 25°C, unless otherwise stated. As used herein, "EI" in figures and tables refers to EDC/NHS treatment for 4 hours at 30°C, unless otherwise stated. In Figure 13, 5 hamster animals were treated with the respective mutant toxin composition, whereas 11 hamster animals were treated with the toxoid purchased from List Biological.

The data in Figure 13 shows that, in hamsters administered according to Table 14, the respective neutralizing antibody titers against toxin A (Figure 13A) and toxin B (Figure 13B) induced by the immunogenic composition including EDC inactivated mutant toxins after two doses is higher than the respective neutralizing antibody titers elicited by the List Biologicals toxoids.

Example 28: Hamster immunogenicity study: *C. difficile* ham2010-02 (continued)

To assess protective efficacy of the mutant toxins, immunized hamsters, along with one control group of non-immunized animals, were first given an oral dose of clindamycin antibiotic (30 mg/kg) to disrupt normal intestinal flora. After five days, the hamsters were challenged with an oral dose of wild type *C. difficile* spores (630 strain, 100 cfu per animal). Animals were monitored daily for eleven days post-challenge for signs of CDAD, which in hamsters is known as wet tail. Using a system of clinical scoring a number of different parameters, animals determined to have severe CDAD were euthanized. The parameters included activity following stimulation, dehydration, excrement, temperature, and weight, etc., which are known in the art.

At day 11, the study was terminated and all surviving animals were euthanized. Figure 14 shows the survival curves for each of the three immunized groups (Groups 1-3, according to Table 14) as compared to the non-immunized controls. As can be seen, the non-immunized animals all developed severe CDAD and required euthanasia between days 1-3 post challenge (0% survival). Both groups administered with formalin-inactivated mutant toxin had 60% survival curves, with animals not requiring euthanasia until day 3 (Group 1) or day 4 (Group 2). The group administered with EDC-inactivated mutant toxin had an 80% survival curve, with 1 (out of 5) animal requiring euthanasia on day 7. Accordingly, the hamsters were protected from lethal challenge with *C. difficile* spores.

Example 29: Hamster immunogenicity study: ham*C. difficile*2010-03: Immunogenicity of genetic and chemically-inactivated *C. difficile* mutant toxins

The purpose of this study was to assess immunogenicity of non-adjuvanted *C. difficile* triple mutant and chemically inactivated mutant toxins A and B (SEQ ID NOs: 4 and 6, respectively) in the Syrian golden hamster model. The same batches of mutant toxins A and B (SEQ ID NOs: 4 and 6, respectively) used in mouse study mu*C. difficile*2010-07 were used in this study. As a control, one group (Group 1) was given a phosphate-buffered saline as placebo.

Groups of five or ten Syrian golden hamsters were immunized with an immunogen according to Table 15. Animals were given three doses. In addition, animals were dosed every two weeks.

Table 15: Experimental Design of Hamster Immunization and Challenge

Group	Immunogen	Dose	No.	Route	Schedule
1	Placebo (PBS buffer)	NA	5	NA	
2	Mutant toxin A+B (SEQ ID NOs: 4 and 6, respectively); Formalin-inactivated	10 µg each	10	IM	Prime wk 0, Boost wks 2, 4
3	Mutant toxin A+B (SEQ ID NOs: 4 and 6, respectively); EDC-Inactivated	10 µg each	10	IM	Prime wk 0, Boost wks 2, 4
4	Mutant toxin A+B (SEQ ID NOs: 4 and 6, respectively); genetic	10 µg each	10	IM	Prime wk 0, Boost wks 2, 4

Results: See Figure 15. No anti-toxin A or B antibodies were observed in the placebo control group. After one dose, anti-toxin A neutralizing antibodies were observed between 2-3 log_{10} for the formalin-inactivated (Group 2) and genetic mutant toxin (Group 4) groups and between 3-4log_{10} for the EDC-inactivated group (Group 3). Anti-toxin A neutralizing antibodies increased in each of these groups (2-4) after the second immunization with the relevant mutant toxins (compare titers at week 2 to week 3 in Figure 15). After the third dose of mutant toxins (given at week 4), anti-toxin A neutralizing antibody titers in Groups 2-4 increased compared to their week 4 titers.

Anti-toxin B neutralizing antibodies were detectable after the second dose, wherein the formalin-inactivated (Group 2) and EDC-inactivated (Group 3) anti-toxin B neutralizing antibodies increased to between 3-4 log_{10} and to between 2-3 log_{10} for the genetic triple mutant (Group 4). Following the third immunization (week 4), the anti-toxin B neutralizing antibody titers boosted to between 3-4 log_{10} for the formalin-inactivated mutant toxins (Group 2) and genetic mutant toxins (Group 4) and between 4-5 log_{10} for the EDC-inactivated mutant toxins (Group 3).

For both anti-toxin A and anti-toxin B neutralizing antibodies, peak titers were observed at week 6 (post-dose 3) for all vaccinated groups (Groups 2-4).

Assessment of Immunogenic Compositions Adjuvanted with Alhydrogel/CpG or ISCOMATRIX

Hamsters immunized with an immunogenic composition including a chemically inactivated mutant toxin formulated with Alhydrogel, ISCOMATRIX, or Alhydrogel/CpG24555 (Alh/CpG) developed robust neutralizing antitoxin antisera. It was observed that peak antitoxin A and antitoxin B responses were 2-3-fold higher and statistically significant in groups immunized with mutant toxins formulated in Alh/CpG or ISCOMATRIX when compared to vaccine formulated with Alhydrogel alone. See Table 32 showing 50% neutralization titers. Hamsters (n=10/ group) were immunized IM at 0, 2, and 4 weeks with 10 µg each mutant toxin A drug substance and mutant toxin B drug substance formulated with 100 µg of Alhydrogel, or 200 µg of CpG 24555 + 100 µg of Alhydrogel, or 10 U of ISCOMATRIX. Sera were collected at each time point and analyzed in the toxin neutralization assay for functional antitoxin activity. Geometric mean titers are provided in Table 32. Asterisks (*) indicate statistical significance ($p<0.05$) when compared to titers in the Alhydrogel group.

Table 32: Immunogenicity of Adjuvanted Mutant Toxin Drug Substances in Hamsters

Antitoxin A	50% Neutralization Titer					
	Week 0	Week 1	Week 2	Week 3	Week 4	Week 6
Alhydrogel Titer:	10	26	88	7425	6128	15965
Alh/CpG Titer:	10	103	*688	*34572	*23028	*62203
ISCOMATRIX Titer:	10	27	*246	*12375	8566	*36244
Antitoxin B						
Alhydrogel Titer:	10	15	10	218	1964	7703
Alh/CpG Titer:	10	10	18	*5550	*5212	*59232
ISCOMATRIX Titer:	10	12	12	*7412	*15311	*92927

Protective efficacy of the immunogenic composition including mutant toxin drug substances formulated with these adjuvants was tested. Hamsters were immunized and were given oral clindamycin (30 mg/kg) on week 5 and challenged according to the method described above. One group of unimmunized hamsters (n=5) was included as a control. Increased efficacy was observed in hamsters immunized with mutant toxin drug substances adjuvanted with either Alh/CpG or ISCOMATRIX (100% survival) as compared to Alhydrogel alone (70% survival). Accordingly, the hamsters were protected from lethal challenge with *C. difficile* spores.

Example 30: *Clostridium difficile* Vaccination in Cynomolgus Macaques

The purpose of this study was to test the immunogenicity of low and high doses of EDC-Inactivated and Formalin-Inactivated *C. difficile* mutant toxins in cynomolgus macaques. All mutant toxins were formulated in ISCOMATRIX® as an adjuvant except for one group, which served as the unadjuvanted control (Group 5).

Table 16: Immunization of Cynomolgus Macaques

Group	Immunogen	Number	Dose	Route	Schedule
1	FI-Mutant toxins A+B (ISCOMATRIX)	5	10 µg each	IM	Prime wk 0, Boost wks 2, 4
2	FI-Mutant toxins A+B (ISCOMATRIX)	5	100 µg each	IM	Prime wk 0, Boost wks 2, 4
3	EI-Mutant toxins A+B (ISCOMATRIX)	5	10 µg each	IM	Prime wk 0, Boost wks 2, 4
4	EI-Mutant toxins A+B (ISCOMATRIX)	5	100 µg each	IM	Prime wk 0, Boost wks 2, 4
5	EI-Mutant toxins A+B (no adjuvant)	5	100 µg each	IM	Prime wk 0, Boost wks 2, 4

Animals: 25 cynomolgus macaques

The asterisk, "*", in figure 16 refers to having only 4 cynos in the group for week 12, one cyno in the group was terminally bled week at 8

Vaccination: IM, 0.5mL per dose, at weeks 0, 2, and 4. Mutant toxin compositions were prepared as described above. The mutant toxin compositions were formulated in ISCOMATRIX, except Group 5 was formulated in buffer without adjuvant.

Bleed: Weeks -2, 0, 2, 3, 4, 6, 8, and 12. Euthanasia and terminal bleeds on animals with highest *C. difficile* titers at week 8.

Serum sample analysis: Protein ELISA and Neutralization assays

Results: Figure 16 shows the anti-toxin neutralizing antibody responses in these animals at weeks 0, 2, 3, 4, 6, 8, and 12. Anti-toxin A titers were between 2-3 $\log_{10}$ for all five groups after a single dose (week 2 titers). These titers boosted after each subsequent dose for each group. In these animals, there was no drop in titer between weeks 3 and 4. For all groups, the peak titers were between 4-5 $\log_{10}$. At all time points, the group without ISCOMATRIX adjuvant (Group 5) had the lowest titers, indicating the utility of ISCOMATRIX at boosting the immune responses. The no-adjuvant control group (Group 5) reached peak titers at week 12, as did the group immunized with the high dose of EDC-inactivated mutant toxins (Group 4); all other groups reached peak titers at week 6, two weeks after the last dose. The titers in all groups boosted after the second dose (week 3 time point). As with the anti-toxin A responses, the anti-toxin B responses did not decrease from week 3 to week 4. After the third dose (week 6 time point), the anti-toxin B neutralizing antibody titers in all groups were between 3-4 $\log_{10}$, except in the low dose formalin-inactivated group (Group 1) and the high dose EDC-inactivated group (Group 4), both of which had titers just >4 $\log_{10}$. The peak titers were observed at week 12 for all groups except the low dose EDC-inactivated group (Group 3), which had peak titers at week 8. All groups had peak titers >4 $\log_{10}$.

Example 31: Monoclonal Antibodies Production

Although toxins A and B share a lot of structural homology, the neutralizing activities of the antibodies were found to be toxin-specific. In this invention, several antibodies were identified that are specific to individual toxin, and directed to various epitopes and functional domains, and have high affinity and potent neutralizing activity toward native toxins. Antibodies were isolated from mice that were immunized with either a commercially available formalin inactivated (FI)-mutant toxin or recombinant holo-mutant toxin (SEQ ID NOs: 4 and 6) rendered non-toxic by introducing specific mutations in its catalytic site for producing toxin A and B mAb, respectively. Epitope mapping of the antibodies showed that the vast majority of the mAb against toxin A (49 out of 52) were directed to the non-catalytic C terminal domain of the toxin.

Monoclonals against toxin B were targeted to three domains of the protein. Out of a total of 17 toxin B specific mAb, 6 were specific to N-terminus (e.g., amino acids 1-543 of a wild-type *C. difficile* TcdB, such as 630), 6 to C-terminus (e.g., amino acids 1834-2366 of a wild-type *C. difficile* TcdB, such as 630) and 5 to mid-translocation domain (e.g., amino acids 799-1833 of a wild-type *C. difficile* TcdB, such as 630). The approach of using mutant *C. difficile* toxins (e.g., SEQ ID NO: 4 and 6) as immunizing antigens thus offers a key advantage of presenting most, if not all, antigenic epitopes as compared to the formalin inactivation process that tend to adversely affect the antigenic structure of the mutant toxin.

Example 32: Characterization of toxin A mAb, A3-25, which includes a variable light chain having the amino acid sequence of SEQ ID NO: 36 and a variable heavy chain having the amino acid sequence of SEQ ID NO: 37.

The mAb A3-25 was of particular interest since this antibody defied all attempts to define its immunoglobulin (Ig) isotyping using the commonly available isotyping kits for IgG, IgM and IgA. Further analysis by western blot using Ig H-chain specific antisera showed that the A3-25 is of IgE isotype, a rare event in mAb production. This was further confirmed by the nucleotide sequencing of mRNA isolated from A3-25 hybridoma cells. The amino acid sequences deduced from the nucleotide sequences of the variable regions of H- and L-chain of A3-25 are shown in Figure 17.

In order to further evaluate the A3-25 mAb in animal model for *C difficile* infection and disease, its Ig isotype was changed to murine IgG1 by molecular grafting of the variable region of ε H chain onto the murine γ heavy chain according to the published methods.

Example 33: Neutralizing Ability and Epitope Mapping of Toxin Specific Antibodies

Further, in an effort to identify functional/neutralizing antibodies, all monoclonals were evaluated for the ability to neutralize wild type toxins in a standard cytopathic effect (CPE) assay or in a more stringent and quantitative assay based on measurement of ATP as cell viability indicator.

Out of a total of 52 toxin A specific antibodies, four mAb (A3-25, A65-33, A60-22 and A80-29 (Table 17 and Figure 18) exhibited varied levels of neutralizing activity. BiaCore competitive binding assay and hemagglutination inhibition (HI) assays were performed to map the antibody epitopes. Results indicated that these antibodies may be targeted to different epitopes of the toxin A protein (Table 17). To further identify the location of binding sites on the protein, the antibodies were individually evaluated in western blot or dot blot assays using toxin fragments of known sequences. All 4 neutralizing mAb were found to be directed to the C-terminus region of the toxin.

From a total of 17 toxin B specific antibodies, 9 were found to be neutralizing. Of the nine neutralizing mAb, six of them were directed to the N-terminus and the other three to the translocation domain of the B toxin (Table 18). Based on the Biacore competitive binding assay, the nine neutralizing monoclonal antibodies may be grouped into four epitope groups as shown in Figure 19.

TABLE 17: Characteristics of Selected Toxin A mAb

Epitope Group (Biacore)	mAb #	Neutralizing activity	Hemagglutination Inhibition	Binding Specificity	Ig Isotype
1	A3-25	+	-	C-teriminal	IgE, κ
2	A65-33	+	-	C-teriminal	IgG2a, κ
3	A80-29	+	+	C-teriminal	IgG1, κ
ND	A60-22	+	+	C-teriminal	IgG1, κ
4	A64-6	-	-	In progress	IgG1, κ
	A50-10	-	-	C-teriminal	IgG1, κ
	A56-33	-	-	In progress	IgG1, κ
ND	A1	-	-	N-terminal	IgG1, κ

TABLE 18: Characteristics of Selected Toxin B mAb

Epitope Group (Biacore)	mAb #	Neutralizing activity	Binding Specificity	Ig isotype
1	B2-31	+	N-terminal	IgG1, κ
	B5-40			IgG1, κ
	B8-26			IgG1, κ
	B70-2			IgG1, κ
2	B6-30	+	N-terminal	IgG1, κ
	B9-30			IgG1, κ
3	B59-3	+	Translocation domain	IgG1, κ
	B60-2			IgG1, κ
4	B56-6	+	Translocation domain	IgG1, κ
	B58-4	-		IgG1, κ
5	B12-34	-	C-terminal	IgG1, κ
	B14-23			IgG1, κ
	B80-3			IgG1, κ
6	B66-29	-	C-terminal	IgG1, κ
7	B84-3	-	C-terminal	IgG1, κ

Example 34: Identification of Novel Toxin A Antibodies Combinations with Significantly Enhanced Neutralizing Activity:

The four toxin A mAb (A3-25, A65-33, A60-22 and A80-29) showed incomplete or partial neutralization of toxin A when tested individually in the ATP based neutralization assay. The mAb A3-25 was the most potent antibody and the other three were less neutralizing with A80-29 barely above background (Figure 18). However, when A3-25 was combined with either one of the other three mAbs, a synergistic effect in neutralization was observed in all three combinations which was far greater than the sum total of neutralization of individual antibodies as shown in Figure 20A-C. In addition, all three combinations exhibited complete neutralization capability normally observed with anti-toxin A polyclonal antibodies.

Example 35: Identification of Novel Toxin B Antibodies Combinations Showing Significantly Enhanced Neutralizing Activity:

We also observed synergistic neutralization with the Toxin B mAbs from the different epitope groups identified by BiaCore analysis. Toxin B mAb B8-26, the most dominant mAb of group 1, was combined with multiple mAbs from group 3. The combinations were evaluated in a toxin B specific neutralization assay and the results are shown in Figure 21 and Table 19.

Table 19: Neutralization of Toxin B with mAbs

mAb	Neut titer	
	CPE	ATP
B8-26 alone	20,480	5,000
B59-3 alone	320	120
B60-2 alone	320	80
B8-26 + B59-3	655,360	~60,000
B8-26 + B60-2	327,680	nd
nd, not done		

The synergistic neutralizing effect was observed when B8-26 was combined with an epitope group 3 mAb (Figure 21B), but not any other mAb (data not shown).

Example 36: *In vitro* screening by mAb for Safe and Efficacious Mutant Toxin Compositions:

Genetic mutant toxins A and B of *C difficile* (e.g., SEQ ID NO: 4 and 6) generated via genetic engineering showed residual cytotoxicity using an *in vitro* cytotoxicity assay. Although we have achieved a ~4 log reduction in cytotoxicity for each mutant toxin *C. difficile* toxin (Table 20), further chemical inactivation of the mutant toxins, such as with formalin treatment was preferred. However, chemical inactivation treatments may be harsh and may adversely affect key antigenic epitopes of these toxins or mutant toxins.

Table 20: A Comparison of *In Vitro* Cytotoxicity of WT Toxin, Triple Mutant Toxin, and Formalin-Inactivated (FI, from List Biological) WT toxins (List Biological, commercial)

Tcd	Source/treatment	EC_{50} ng/mL	Fold Reduction in Cytotoxicity
TcdA			
Toxin A (SEQ ID NO: 1)	WT	0.92	1
Mutant toxin A (SEQ ID NO: 4)	Triple mutant	8600	9348
Toxoid A (FI)	Formalin treated, commercial	>20,000	>21,739
TcdB			
Toxin B (SEQ ID NO: 2)	WT	0.009	1
Mutant toxin B (SEQ ID NO: 6)	Triple mutant	74	8222
Toxoid B (FI)	Formalin treated, commercial	4300	477,778

For bioprocess optimization, a statistical design of experiment (DOE) was performed for the chemical inactivation of triple mutant Tcd A and B (1 mg/mL) using formalin and EDC/NHS treatment. To optimize formalin inactivation of triple mutant TcdA, we varied concentrations of formalin/glycine (20-40 mM), pH (6.5-7.5), and temperature (25-40ºC). For triple mutant TcdB, we varied the formalin/glycine concentration from 2 to 80 mM and the temperature and pH were 25 ºC and 7.0 respectively. The incubation time for all formalin treatments was 24 hours. For the formalin inactivation, "40/40" in Tables 21 and 23 represents the concentration of formalin and glycine used in the reaction. For EDC/NHS treatment, we varied the concentrations of EDC/NHS from 0.25 to 2.5 mg/mg of triple mutant TcdA and from 0.125 to 2.5 mg/mg of triple mutant TcdB and incubated for four hours at 25 ºC. At the end of the reactions, all samples were desalted in 10 mM phosphate, pH 7.0. After purification, the treated Tcds were analyzed for residual cytotoxicity and mAb recognition of epitopes by dot-blot analysis. The goal was to identify treatment conditions that reduce cytotoxicity to the desired level (EC_{50} > 1000 µg/mL) without negatively impacting epitopes recognized by a panel of neutralizing mAbs (++++ or +++). The treatment conditions (marked with a check mark "✓" in Tables 21-24) yielded potentially safe and efficacious immunogenic compositions that retained reactivity to at least four neutralizing mAbs while exhibiting 6-8 $\log_{10}$ reduction in cytotoxicity, relative to the respective wild-type toxin cytotoxicity. Select results are illustrated in Tables 21 to 24. Additional data from varying treatment conditions on the triple mutant toxins and the data from *in vitro* cytotoxicity and toxin neutralization assays are shown in Table 33 and Table 34. See also, for example, Examples 20 and 21 above, which provide further details regarding preferred crosslinking treatment conditions of the mutant toxins.

Table 21: Cytotoxicity and Neutralizing mAb Reactivity of Formalin-inactivated Triple Mutant TcdA (SEQ ID NO: 4)

Chemical inactivation reaction conditions on Triple Mutant TcdA	CPE µg /mL	Reactivity with mAb (dot blot, non-denaturing conditions)					
		N-terminal Mab#6	Translocation Domain Mab# 102	C-terminal (neut)			
				A80-29	A3-25	A60-22	A65-33
25°C, pH 6.5, 20/20mM	250	++++	++++	++++	++++	++++	++++
25°C, pH 6.5, 40/40mM ✓	>1000	++++	++++	++++	++++	++++	++++
25°C, pH 7.5, 40/40mM ✓	>1000	++++	++++	++++	++++	++++	++++
40°C, pH 6.5, 40/40mM	>1000	++	+++	++++	++++	++++	++++
40°C, pH 7.5, 40/40mM	>1000	++	++	++++	++++	++++	+++
None, Triple mutant toxin A	18.5-25	++++	++++	++++	++++	++++	++++
FI Toxoid A (List Biological)	ND	—	—	++	++	+++	+

Table 22: Cytotoxicity and Neutralizing mAb Reactivity of EDC-inactivated Triple Mutant TcdA (SEQ ID NO: 4)

		Reactivity with mAb (dot blot, non-denaturing conditions)					
Chemical inactivation reaction conditions on Triple Mutant TcdA	CPE µg /mL	N-terminal Mab#6	Translocation Domain Mab# 102	C-terminal (neut)			
				A80-29	A3-25	A60-22	A65-33
25°C, 0.25mg/mg, 4hr ✓	>1000	++++	++++	++++	++++	++++	++++
25°C, 0.5mg/mg, 4hr ✓	>1000	++++	++++	++++	++++	++++	++++
25°C, 1.25mg/mg, 4hr ✓	>1000	+++	++++	++++	+++	++++	++++
25°C, 2.5mg/mg, 4hr ✓	>1000	+++	++++	++++	+++	++++	+++
None, Triple mutant TcdA	18.5-25	++++	++++	++++	++++	++++	++++
FI Toxoid A (List Biological)	ND	—	—	++	++	+++	+

Table 23: Cytotoxicity and Neutralizing mAb Reactivity of Formalin-inactivated Triple Mutant TcdB (SEQ ID NO: 6)

Chemical inactivation reaction conditions on Triple Mutant TcdB	CPE (µg /mL)	mAb # (N-terminal aa 1 – 543)		mAb # (mid-/C-terminal aa 544 – 2366)	
		B8-26	B9-30	B56-6	B59-3
25°C,pH 7.0, 80/80mM, 24hr ✓	>1000	++++	++++	++++	+++
25°C, pH 7.0, 40/40mM, 24hr ✓	>1000	++++	++++	++++	++++
25°C, pH 7.0, 10/10mM, 24hr	15.6	++++	++++	++++	++++
25°C, pH 7.0, 2/2mM, 24hr	<0.98	++++	++++	++++	++++
None, Triple mutant TcdB	0.058	++++	++++	++++	++++
FI Toxoid B (List Biological)	ND	+++	+++	+++	++

Table 24: Cytotoxicity and Neutralizing mAb Reactivity of EDC-inactivated Triple Mutant TcdB (SEQ ID NO: 6)

Chemical inactivation reaction conditions on Triple Mutant TcdB	CPE (µg /mL)	mAb # (N-terminal aa 1 – 543) 8-26 9-30		mAb # (mid-/C-terminal aa 544 – 2366) 56-6 59-3	
		B8-26	B9-30	B56-6	B59-3
25°C, 0.125mg/mg, 4hr	3.9	++++	++++	++++	++++
25°C, 0.25mg/mg, 4hr	250	++++	++++	++++	++++
25°C, 0.5mg/mL, 4hr ✓	>1000	++++	++++	++++	++++
25°C, 1.25mg/mg, 4hr ✓	>1000	++++	+++	+++	+++
25°C, 2.5mg/mg, 4hr ✓	>1000	++++	+++	+++	+++
None, Triple mutant TcdB	0.058	++++	++++	++++	++++
FI Toxoid B (List Biological)	ND	+++	+++	+++	++

5

Table 33

		Cyto Assay (EC50)		Reactivity with mAb (dot blot, non-denaturing conditions)					
Sample #	Mutant toxin A (SEQ ID NO: 4) Sample ID	CPE; 24h µg /mL	CPE, 72h µg /mL	N-terminal Mab#6	Translocation Domain Mab# 102	C-terminal (neut)			
						80-29	3-25	60-22	65-33
1	L44166-157A	>1000	>1000	++++	++++	++++	+++	++++	++++
2	L44166-157B	>1000	>1000	+++	++++	++++	+++	++++	++++
3	L44166-157C	>1000	>1000	+++	+++	++++	+++	++++	++++
4	L44166-157D	>1000	>1000	+++	+++	++++	+++	++++	++++
5	L44905-160A	>1000	>1000	++	++	++++	++	++++	++++
6	L44166-166	>1000	>1000	++++	++++	++++	++++	++++	++++
7	L44905-170A	ND	>1000	+	+	++	++	++	+
8	L44897-61	>1000	ND	+++	++	++++	++++	++++	++++
9	L44897-63	>1000	ND	++++	+++	++++	+++	++++	++++
10	L44897-72 Tube#1	250	ND	++++	++++	++++	++++	++++	++++
11	L44897-72 Tube#2	>1000	ND	++++	++++	++++	++++	++++	++++
12	L44897-72 Tube#3	>1000	ND	+++	+++	++++	++++	++++	++++
13	L44897-72 Tube#4	>1000	ND	+++	++++	++++	++++	++++	++++
14	L44897-72 Tube#5	>1000	ND	+++	++++	++++	++++	++++	++++
15	L44897-75 Tube#6	>1000	ND	+++	++++	++++	++++	++++	++++
16	L44897-75 Tube#7	>1000	ND	++++	++++	++++	++++	++++	++++
17	L44897-75 Tube#8	>1000	ND	++++	++++	++++	++++	++++	++++
18	L44897-75 Tube#9	>1000	ND	++	+++	++++	++++	++++	++++
19	L44897-75 Tube#10	>1000	ND	++++	++++	++++	++++	++++	++++
20	L44897-75 Tube#11	>1000	ND	++	++	++++	++++	++++	+++
21	L44897-101 (pre-modification) TxA control	23.4	<7.8	++++	++++	++++	++++	++++	++++
22	L44897-101, 2 hr	187.5	155.9	+++	++++	++++	++++	++++	++++
23	L44897-101, 4 hr	375	380.3	+++	++++	++++	++++	++++	++++
24	L44897-101, 6 hr	500	429.6	+++	++++	++++	++++	++++	++++

25	L44897 102, 24 hr	>1000	>1000	++	++++	++++	++++	++++	++++
26	L44897-103, 51 hr	>1000	>1000	+	+++	+++	++++	++++	+++
27	L44897-104, 74 hr	>1000	>1000	—	+++	+++	+++	+++	+++
28	L44897-105, 120 hr	>1000	>1000	—	++	++	+++	+++	++
29	L44980-004	>1000	>1000	++++	++++	++++	++++	++++	++++
30	Reaction #1 Week 0, 25C	750 ug/mL	ND	ND	++	++	+++	+++	++
31	Reaction #1 Week 1, 25C	375 ug/mL	ND	ND	+++	+++	+++	+++	+++
32	Reaction #1 Week 2, 25C	375 ug/mL	ND	ND	+++	+++	+++	+++	+++
33	Reaction #1 Week 3, 25C	375 ug/mL	ND	ND	+++	+++	+++	+++	+++
34	Reaction #1 Week 4, 25C	250 ug/mL	ND	ND	+++	+++	+++	+++	+++
35	Reaction #1 Week 3, 37C	93.8 ug/mL	ND	ND	++++	++++	++++	++++	++++
36	Reaction #2 Week 0, 25C	375 ug/mL	ND	ND	+++	+++	+++	+++	+++
37	Reaction #2 Week 1, 25C	375 ug/mL	ND	ND	++++	++++	++++	++++	++++
38	Reaction #2 Week 2, 25C	750 ug/mL	ND	ND	++	++	++	+++	++
39	Reaction #2 Week 3, 25C	250 ug/mL	ND	ND	+++	+++	+++	++++	+++
40	Reaction #2 Week 4, 25C	250 ug/mL	ND	ND	+++	+++	+++	++++	+++
41	Reaction #2 Week 3, 37C	187.5 ug/mL	ND	ND	+++	+++	++++	++++	+++
42	TxA Control Week 3, 25C	18.8 ug/mL	ND	ND	++++	++++	++++	++++	++++
43	TxA Control Week 3, 37C	25 ug/mL	ND	ND	++++	++++	++++	++++	++++
44	L44897-116-6 29.5 hrs	> 2000 ug/mL	ND	ND	++	++	++	+++	++
45	L44897-116-7 57.5 hrs	> 2000 ug/mL	ND	ND	++	++	++	+++	++
46	L44897-116 -8 79.5 hrs	> 2000 ug/mL	ND	ND	+	+	+	+++	+
47	L44897-116-9 123.5 hrs	> 2000 ug/mL	ND	ND	++	++	++	+++	++
48	L44897-139	>1000	ND	++	++++	++++	++++	++++	++++
49	L44166-204	>1000	ND	++++	++++	++++	++++	++++	++++

Chemical crosslinking reaction conditions for the samples of triple mutant toxin A (SEQ ID NO: 4) referenced in Table 33

Samples 1-4 were modified with EDC/NHS. Conditions: 30°C, 20 mM MES/150 mM NaCl pH 6.5. Reactions were initiated by addition of EDC. After 2 hours reaction, samples A, B, and C had 1 M glycine added to 50 mM glycine final concentration. Sample D had no glycine added. The reactions were set up with different weight ratios of Mutant toxin A (SEQ ID NO: 4):EDC:NHS as indicated below.

1 L44166-157A 1: 0.25: 0.25 w: w: w

2 L44166-157B 1: 1.25: 1.25

3 L44166-157C 1: 2.5: 2.5

4 L44166-157D 1: 2.5: 2.5

Sample 5 L44905-160A 80 mM HCHO, 80 mM glycine, 80mM NaPO4 pH 7, 1mg/mL Mutant toxin A (SEQ ID NO: 4) Protein, 48 hrs reaction at 25 °C.

Sample 6 L44166-166 EDC/NHS modification of Mutant toxin A (SEQ ID NO: 4) at 25 °C in 20 mM MES/150mM NaCl pH 6.5. Mutant toxin A (SEQ ID NO: 4):EDC:NHS = 1:0.5:0.5. Reaction initiated by addition of EDC. After 2 hours reaction, 1M glycine added to 0.1 M glycine final concentration and further 2 hour incubation. After this time, reaction buffer exchanged into 1 X PBS on Sephadex G25.

Sample 7 L44905-170A 80 mM HCHO, 80 mM glycine, 80mM $NaPO_4$ pH 7, 1mg/mL Mutant toxin A (SEQ ID NO: 4) Protein, 48 hrs reaction at 35 C. This formalin reaction was directed at producing excessive crosslinking so that antigen binding would be severely diminished.

Sample 8 L44897-61 32 mM HCHO/80 mM glycine, 72 hrs reaction at 25 °C.

Sample 9 L44897-63 80 mM HCHO/80 mM glycine, 72 hrs reaction at 25 °C.

The following reactions all had 24 hrs reaction time.

Sample 10 L44897-72 Tube#1 25°C, 80 mM NaPi pH 6.5, 20 mM HCHO/20 mM glycine

Sample 11 L44897-72 Tube#2 25 °C, 80 mM NaPi pH 6.5, 40 mM HCHO/40 mM glycine

Sample 12 L44897-72 Tube#3 32.5 °C, 80 mM NaPi pH 7.0, 30 mM HCHO/30 mM glycine

Sample 13 L44897-72 Tube#4 32.5 °C, 80 mM NaPi pH 7.0, 30 mM HCHO/30 mM glycine

Sample 14 L44897-72 Tube#5 32.5 °C, 80 mM NaPi pH 7.0, 30 mM HCHO/30 mM glycine

Sample 15 L44897-75 Tube#6 25 °C, 80 mM NaPi pH 7.5, 20 mM HCHO/20 mM glycine

Sample 16 L44897-75 Tube#7 25 °C, 80 mM NaPi pH 7.5, 40 mM HCHO/40 mM glycine

Sample 17 L44897-75 Tube#8 40 °C, 80 mM NaPi pH 6.5, 20 mM HCHO/20 mM glycine

Sample 18 L44897-75 Tube#9 40 °C, 80 mM NaPi pH 6.5, 40 mM HCHO/40 mM glycine

Sample 19 L44897-75 Tube#10 40 °C, 80 mM NaPi pH 7.5, 20 mM HCHO/20 mM glycine

Sample 20 L44897-75 Tube#11 40 °C, 80 mM NaPi pH 7.5, 40 mM HCHO/40 mM glycine

The following 8 samples were reacted at 25 °C for the indicated times in 80 mM NaPi pH 7.0 containing 78 mM HCHO and 76 mM glycine

Sample 21 L44897-101 (pre-modification) TxA control time zero control sample, not modified or exposed to HCHO/glycine

Sample 22 L44897-101, 2 hr

Sample 23 L44897-101, 4 hr

Sample 24 L44897-101, 6 hr

Sample 25 L44897 102, 24 hr

Sample 26 L44897-103, 51 hr

Sample 27 L44897-104, 74 hr

Sample 28 L44897-105, 120 hr

Sample 29 (L44980-004) was EDC/NHS modified Mutant toxin A (SEQ ID NO: 4) (triple mutant toxin A (SEQ ID NO: 4)-EDC). Reaction conditions are: 25 °C, buffer was 20 mM MES/150 mM NaCl pH 6.6. Triple mutant toxin A (SEQ ID NO: 4):EDC:NHS = 1:0.5:0.5 w:w:w. Reaction initiated by addition of EDC. After 2 hours reaction, glycine added to 0.1 M final concentration and reacted further 2 hours at 25 C. Reaction terminated by desalting on Sephadex G25.

The following 12 samples and 2 controls were reversion experiments where samples were incubated at 25°C and 37 °C.

Reaction 1 = 25 °C, 80 mM NaPi pH 7.0, 40 mM HCHO only (no glycine), 24 hour reaction.

Reaction 2 = 25 °C, 80 mM NaPi pH 7.0, 40 mM HCHO/40 mM glycine, 24 hour reaction

Sample	Reaction
30	Reaction #1 Week 0, 25°C
31	Reaction #1 Week 1, 25°C
32	Reaction #1 Week 2, 25°C
33	Reaction #1 Week 3, 25°C
34	Reaction #1 Week 4, 25°C
35	Reaction #1 Week 3, 37°C
36	Reaction #2 Week 0, 25°C
37	Reaction #2 Week 1, 25°C
38	Reaction #2 Week 2, 25°C
39	Reaction #2 Week 3, 25°C
40	Reaction #2 Week 4, 25°C
41	Reaction #2 Week 3, 37°C
42	TxA Control Week 3, 25°C
43	TxA Control Week 3, 37°C

The next 4 samples were generated by reaction for the indicated times at 25 °C in 80 mM NaPi pH 7.0, 40 mM HCHO/40 mM glycine

44	L44897-116-6 29.5 hrs
45	L44897-116-7 57.5 hrs
46	L44897-116 -8 79.5 hrs
47	L44897-116-9 123.5 hrs

Sample 48 L44897-139 48 hrs reaction at 25 °C, 80 mM NaPi pH 7.0, 40 mM HCHO/ 40 mM glycine.

Sample 49 L44166-204 EDC/NHS modification of Mutant toxin A (SEQ ID NO: 4). 25 C, buffer 1 x PBS pH7.0. Mutant toxin A (SEQ ID NO: 4):EDC:NHS = 1:0.5:0.5 w:w:w. 2 hours reaction with EDC/NHS, then 1 M glycine added to 0.1 M final concentration and further 2 hours reaction. Buffer exchanged on Sephadex G25 into 20 mM L-histidine/100 mM NaCl pH 6.5.

Table 34

	Cyto Assay (EC50)		Reactivity with neut mAb (dot blot, non-denaturing conditions)				Strong reactivities to all 4 mAbs
Mutant toxin B Sample ID	CPE; 24h	ATP, 72h	mAb # (N-terminal aa 1 – 543) 8-26 9-30		mAb # (mid-/C-terminal aa 544 – 2366) 56-6 59-3		
L44905-86-01 Triple mutant toxin B (SEQ ID NO: 6), Untreated Control	<0.1 µg /mL	<0.1µg/mL	++++	++++	++++	++++	√
L44905-86-02 Triple mutant toxin B (SEQ ID NO: 6), Rxn1, 10°C, day1	≥100 µg/mL	2.2µg/mL	++++	++++	++++	++++	√
L44905-86-03 Triple mutant toxin B (SEQ ID NO: 6), Rxn1, 25°C, day1	>100 µg/mL	>100 µg/mL	+++	++++	++	+++	√*
L44905-86-04 Triple mutant toxin B (SEQ ID NO: 6), Rxn2, 10°C, day1	>100 µg/mL	5.2 µg/mL	++++	++++	++++	++++	√
L44905-86-05 Triple mutant toxin B (SEQ ID NO: 6), Rxn2, 25°C, day1	>100 µg/mL	>100 µg/mL	++++	++++	++	+++	√*

L44905-86-06 Triple mutant toxin B (SEQ ID NO: 6), Rxn3, 10°C, day1	>100 µg/mL	>100 µg/mL	++++	-	++++	+++	
L44905-86-07 Triple mutant toxin B (SEQ ID NO: 6), Rxn3, 25°C, day1	>100 µg/mL	>100 µg/mL	++++	-	++++	+++	
L44905-86-08 Triple mutant toxin B (SEQ ID NO: 6), Rxn1, 10°C, day5	>100 µg/mL	>100 µg/mL	++++	++++	++++	+++	√
L44905-86-09 Triple mutant toxin B (SEQ ID NO: 6), Rxn1, 25°C, day5	>100 µg/mL	>100 µg/mL	++	++	-	+	
L44905-86-10 Triple mutant toxin B (SEQ ID NO: 6), Rxn2, 10°C, day5	>100 µg/mL	>100 µg/mL	++++	++++	++++	++++	√
L44905-86-11 Triple mutant toxin B (SEQ ID NO: 6), Rxn2, 25°C, day5	>100 µg/mL	>100 µg/mL	++	++++	-	+	
L44905-86-12 Triple mutant toxin B (SEQ ID NO: 6), Rxn3, 10°C, day5	>100 µg/mL	>100 µg/mL	++++	-	++++	+++	
L44905-86-13 Triple mutant toxin B (SEQ ID NO: 6), Rxn3, 25°C, day5	>100 µg/mL	>100 µg/mL	++++	-	++++	++++	

L44905-86-14 Triple mutant toxin B (SEQ ID NO: 6), Rxn1, 10°C, day7	>100 µg/mL	>100 µg/mL	++++	++++	++++	++++	√
L44905-86-15 Triple mutant toxin B (SEQ ID NO: 6), Rxn1, 25°C, day7	>100 µg/mL	>100 µg/mL	+++	++++	-	+	
L44905-86-16 Triple mutant toxin B (SEQ ID NO: 6), Rxn2, 10°C, day7	>100 µg/mL	>100 µg/mL	+++	++++	+++	++++	√
L44905-86-17 Triple mutant toxin B (SEQ ID NO: 6), Rxn2, 25°C, day7	>100 µg/mL	>100 µg/mL	++	++	-	+	
L44905-86-18 Triple mutant toxin B (SEQ ID NO: 6), Rxn3, 10°C, day7	>100 µg/mL	>100 µg/mL	++++	-	++++	++++	
L44905-86-19 Triple mutant toxin B (SEQ ID NO: 6), Rxn3, 25°C, day7	>100 µg/mL	>100 µg/mL	+++	-	++	++	
L34346-30A	>100 µg/mL	>100 µg/mL	++++	++++	++++	++++	√
L34346-30B	>100 µg/mL	>100 µg/mL	+++	++++	++++	++++	√
Commercial, FI Toxoid B (List Biologicals)	ND	ND	++++	++++	++++	++++	√

Commercial, Control Toxin B wt (List Biologicals)	22.5 pg/ mL	7.8 pg/mL	+++	++	+++	+++	√
Control, recombinant triple mutant toxin B (SEQ ID NO: 6)	78 ng/mL	72 ng/ml	+++	++	++++	+++	√

Chemical crosslinking reaction conditions for the samples of mutant toxin B referenced in Table 34

Triple mutant toxin B (SEQ ID NO: 6) was chemically crosslinked and tested according to the following reaction conditions. The L44905-86 samples were tested in an experiment involving three formalin reaction variations and two incubation temperatures. Each day, 6 samples were taken for a total of 18 samples. The first sample in the list is the untreated control (which makes 19 samples total). The untreated control included an untreated triple mutant toxin B polypeptide (SEQ ID NO: 6).

Reaction1 ("Rxn1") = 80 mM HCHO, 80 mM glycine, 80mM NaPO4 pH 7, 1mg/mL Triple mutant toxin B (SEQ ID NO: 6) Protein

Reaction2 ("Rxn2") = 80 mM HCHO, No glycine, 80mM NaPO4 pH 7, 1mg/mL Triple mutant toxin B (SEQ ID NO: 6) Protein

Reaction3 ("Rxn3") = 80 mM HCHO, No glycine, 80mM NaPO4 pH 7, 1mg/mL Triple mutant toxin B (SEQ ID NO: 6) Protein + Cyanoborohydride capping. Cyanoborohydride Capping involved 80mM $CNBrH_4$ added to desalted final reaction and incubated 24 hr at 36°C.

For Sample L34346-30A 0.5g EDC and NHS per gram of triple mutant toxin B (SEQ ID NO: 6), 4 hours at 30°C,in 20 mM MES, 150mM NaCl, pH 6.5.

For Sample L34346-30B 0.5g EDC and NHS per gram of triple mutant toxin B (SEQ ID NO: 6), 2 hours at 30°C followed by addition of glycine (final concentration of g/L) and incubated another 2 hours at 30°C, in 20 mM MES, 150mM NaCl, pH 6.5. The only difference between the two reactions for L34346-30A and L34346-30B is the addition of glycine to reaction L34346-30B.

Example 37: Antibodies Induced by Immunogenic Compositions are Capable of Neutralizing Toxins from Various *C. difficile* Strains

To assess whether antibodies induced by the immunogenic compositions including the mutant toxin drug substances can neutralize a broad spectrum of diverse toxin sequences, strains representing diverse ribotypes and toxinotypes were sequenced to identify the extent of genetic diversity among the various strains compared to the mutant toxin drug substances. Culture supernatants containing secreted toxins from the various strains were then tested in an *in vitro* neutralization assay using sera from immunized hamsters to determine the coverage of the immunogenic composition and to determine the ability of the immunogenic composition to protect against diverse toxins from circulating clinical strains.

Both HT-29 cells (colon carcinoma cell line) and IMR-90 cells were used to test the neutralization of toxins expressed from CDC strains. HT-29 cells are more sensitive to TcdA; the EC_{50} of the purified TcdA in these cells is 100 pg/mL as compared to 3.3 ng/mL for TcdB. On the other hand IMR-90 cells are more sensitive to TcdB; the EC_{50} of the purified TcdB in these cells ranges between 9-30 pg/mL as compared to 0.92-1.5 ng/mL for TcdA. The assay specificity for both TcdA and TcdB in these cell lines was confirmed by using both polyclonal and monoclonal toxin-specific antibodies. For assay normalization, culture filtrates of the 24 CDC isolates were tested at a concentration four times their respective EC_{50} value. Three of the strains had toxin levels that were too low for testing in the neutralization assay.

Twenty-four strains representing diverse ribotypes/ toxinotypes covering greater than 95% of the circulating strains of *C. difficile* in the USA and Canada were obtained from the CDC. Among these isolates were strains representing ribotypes 027, 001 and 078, three epidemic strains of CDAD in the United States, Canada and UK. Strains 2004013 and 2004118 represented ribotype 027; strain 2004111 represented ribotype 001 and strains 2005088, 2005325 and 2007816 represented ribotype 078. To identify the extent of genetic diversity between the disease-causing clinical isolates and the 630 strain, the toxin genes (*tcdA* and *tcdB*) from these clinical strains were fully sequenced. See Table 35. The amino acid sequences of the toxins were aligned using ClustalW in the Megalign™ program (DNASTAR® Lasergene®) and analyzed for sequence identity. For *tcdA*, genomic alignment analysis showed that all of the clinical isolates and strain 630 shared overall about 98-100% amino acid sequence identity. The C-terminal

portion of the *tcdA* gene was slightly more divergent. The same analysis was performed for the *tcdB* gene which exhibited greater sequence divergence. Notably strains 2007838/NAP7/126 and 2007858/NAP1/unk5 displayed the most divergent patterns from the 630 strain in the N terminal (79-100%) and the C terminal domains (88-100%; data not shown).

A hamster serum pool (HS) was collected from the Syrian golden hamsters that were immunized with an immunogen including mutant TcdA (SEQ ID NO: 4) and mutant TcdB (SEQ ID NO: 6), wherein the mutant toxins were inactivated with EDC, according to, for example, Example 29, Table 15, described above, and formulated with aluminum phosphate. The results in Table 35 show that at least toxin B from the respective culture supernatants were neutralized, in an *in vitro* neutralization assay, by sera from the immunized hamsters.

Table 35. Description of *C. difficile* strains from CDC and Ability of Immune Hamster Sera to Neutralize Various Toxins

Strain	PFGE Type	Ribotype	Neutralized by Hamster Sera
2005088	NAP7	78	yes
2007816	NAP7-related	78	yes
2005325	NAP7	78	yes
2004013	NAP1	27	yes
2007886	NAP1		yes
2008222	NAP4	77	yes
2004206	NAP4	154	yes
2005283	NAP5	Unk3	Not tested[b]
2009141	NAP2		yes
2007838	NAP7	126	yes
2004111	NAP2	1	yes
2007070	NAP10	70	yes
2006017	NAP12	15	yes
2009078	NAP11	106	Not tested[b]
2007217	NAP8	126	yes
2006376	NAP9	17	yes
2007302	NAP11	Unk2	yes
2004118	NAP1	27	yes
2005022	NAP3	53	yes
2009292	NAP1		yes
2004205	NAP6	2	yes
2007858	NAP1	Unk5	yes
2009087	NAP11	106	Not tested[b]
2005359	NAP1-related		yes

b Toxin levels were too low to perform the neutralization assay.

Figure 23 depicts the results of the neutralization assay using toxin preparations from various *C. difficile* strains on IMR-90 cells. The data show TcdB neutralizing antibodies in the hamster antisera were capable of neutralizing toxins from all 21 isolates tested, including hypervirulent strains and a TcdA-negative, TcdB-positive strain. At least 16 different strains of *C. difficile* were obtained from the CDC (Atlanta, GA)(previously described) and were cultured in *C. difficile* culture media under suitable conditions as known in the art and as described above. Culture supernatants containing the secreted toxins were analyzed to determine their cytotoxicity (EC_{50}) on IMR-90 monolayers and subsequently tested in a standard *in vitro* neutralization assay at 4 times the EC_{50} using various dilutions of sera from hamsters immunized with mutant toxin A drug substance and mutant toxin B drug substance, formulated with aluminium phosphate. Crude toxin obtained from culture supernatants of each strain and purified toxin (commercial toxin obtained from List Biologicals)(not purified from respective supernatants) were tested for cytotoxicity to IMR-90 cells using the *in vitro* cytotoxicity assay described above.

In Figures 23A-K, the graphs show results from *in vitro* cytotoxicity tests (previously described) in which the ATP levels (RLUs) are plotted against increasing concentrations of: *C. difficile* culture media and the hamster serum pool (■); crude toxin and the hamster serum pool (●); purified toxin and the hamster serum pool (▲); crude toxin (▼), control; and purified toxin (◆), control. The toxins from the respective strains were added to the cells at $4xEC_{50}$ values.

As shown in Figures 23A-K, the hamsters that received the described immunogen surprisingly developed neutralizing antibodies that exhibited neutralizing activity against toxins from at least the following 16 different CDC strains of *C. difficile*, in comparison to the respective toxin only control: 2007886 (Figure 23A); 2006017 (Figure 23B); 2007070 (Figure 23C); 2007302 (Figure 23D); 2007838 (Figure 23E); 2007886 (Figure 23F); 2009292 (Figure 23G); 2004013 (Figure 23H); 2009141 (Figure 23I); 2005022 (Figure 23J); 2006376 (Figure 23K). See also Table 35 for additional *C. difficile* strains from which toxins were tested and were neutralized by the immunogenic composition including a mutant toxin A drug substance and mutant toxin B drug substance, formulated in aluminum phosphate.

In another study, culture supernatants containing secreted toxins from the various *C. difficile* strains (obtained from the CDC and from Leeds Hospital, UK) were tested in the *in vitro* neutralization assay using sera from hamsters that were administered with mutant toxin A drug substance and mutant toxin B drug substance, formulated with Alhydrogel. See Table 36 for the experimental design. The results are shown in Table 37 and Table 38.

Table 36: Experimental design

Assay Control	In assay using HT-29 cells: Rabbit anti-serum (Anti-Toxin A polyclonal Fitzgerald Industries, #70-CR65) and Reference Toxin A (wild-type toxin A from List Biologicals) In assay using IMR-90 cells: Rabbit anti-serum (Anti-Toxin B polyclonal Meridian Life Science, #B01246R) and Reference Toxin B (wild-type toxin B from List Biologicals)
Sample Controls	In assay using HT-29 cells: HS serum + Reference Toxin A In assay using IMR-90 cells: HS serum + Reference Toxin B
	HS serum+630 wt toxin
	HS serum+ Culture media of IMR-90 or HT-29 cell line
	HS serum+ culture supernatant of VPI11186
Test Sample	HS + respective *C. difficile* culture supernatant
Source of Hamster antiserum (HS)	Animals administered with mutant toxin A drug substance and mutant toxin B drug substance formulated with Alhydrogel

Table 37: Immunogenic Composition-induced Antibodies Neutralized Toxin A and Toxin B from Various Wild-type *C. difficile* Strains from the CDC, including Hypervirulent strains

Cdiff Strain	PFGE Type	Ribotype	Toxinotype	Other Typing Method	Neutralized by HS (IMR-90, Toxin B)	Neutralized by HS (HT-29, Toxin A)
2004111	NAP2	1	0	Respective toxin sequence has 100% Homology to toxin from Strain 630	Yes	Yes
2009141	NAP2		0		Yes	Yes
2006017	NAP12	15	0		Yes	Yes
2007302	NAP11	Unk2	0		Yes	Yes
2009087	NAP11	106	0		Yes	Yes
2005022	NAP3	53	0		Yes	Yes
2005283	NAP5	Unk3	0		Yes	Yes
2009078	NAP5	53	0		Yes	Yes
2004206	NAP4	154	0		Yes	Yes
2008222	NAP4	77	0		Yes	Yes
2004205	NAP6	2	0		Yes	Yes
2007070	NAP10	70	0		Yes	Yes
2006376	NAP9	17	VIII	txnA-/txnB+	Yes	N/A
2007816	NAP7-related	78	V	Increasing prevalence in US and Europe	Yes	Yes
2007838	NAP7	126			Yes	Yes
2005088	NAP7	78			Yes	Yes
2005325	NAP7	78			Yes	Yes
2007217	NAP8	126			Yes	Yes
2004013	NAP1	27	III	Hypervirulent NAP1/027/III	Yes	Yes
2004118	NAP1	27			Yes	Yes
2009292	NAP1				Yes	Yes
2005359	NAP1-related				Yes	Yes
2007858	NAP1	Unk5	IX/XXIII	Other	Yes	Yes
2007886	NAP1		IX/XXIII		Yes	Yes

Table 38: Immunogenic Composition-induced Antibodies Neutralized Toxin A and Toxin B from Various Wild-type *C. difficile* Strains from Europe, including Hypervirulent strains

Cdiff Strain	PFGE Type	Other Typing Method	Toxin type	Neutralized by HS (IMR-90, Toxin B)	Neutralized by HS (HT-29, Toxin A)
001	NAP2	Toxinotype 0 Strains	0	Yes	Yes
002	NAP6			Yes	Yes
012 (004)	NAPCR1			Yes	Yes
014	UK			Yes	Yes
015	NAP12			Yes	Yes
020	NAP4			Yes	Yes
029	UK			Yes	Yes
046	UK			Yes	Yes
053	NAP5			Yes	Yes
059	UK			Yes	Yes
077	UK			Yes	Yes
078	UK			Yes	Yes
081	UK			Yes	Yes
087	UK			Yes	Yes
095	UK			Yes	Yes
106	UK			Yes	Yes
117	UK			Yes	Yes
017	NAP9	txnA-/txnB+	VIII	Yes	NA
027	NAP1	Hypervirulent	III	Yes	Yes
075	UK			Yes	Yes
003	NAP10	Other	I	Yes	Yes
023	UK		IV	Yes	Yes
070	UK		XIII	Yes	Yes
126	UK		UK	Yes	Yes
131	UK		UK	In Progress	Yes

Wild-type *C. difficile* strains obtained from Leeds Hospital, UK.

"UK" = unknown status

NA, not applicable; strain does not make toxin A; was not tested in Toxin A neutralization assay

Example 38: Peptide mapping of EDC/NHS triple mutant toxins

To characterize the EDC/NHS inactivated triple mutant toxins, peptide mapping experiments were performed on four lots of EDC/NHS-treated triple mutant toxin A (SEQ ID NO: 4) and four lots of EDC/NHS-treated triple mutant B (SEQ ID NO: 6). After digesting the mutant toxins with trypsin, the resulting peptide fragments were separated using reverse-phase HPLC. Mass spectral analysis was used to identify modifications that occur as a result of the inactivation process. For both mutant toxin A drug substance and mutant toxin B drug substance, greater than 95% of the theoretical tryptic peptides were identified. Crosslinks and glycine adducts (glycine was used as the capping agent) were identified. In both mutant toxin A drug substance and mutant toxin B drug substance, beta-alanine adducts were also observed. Without being bound by mechanism or theory, the beta-alanine adducts appear to result from the reaction of three moles of NHS with one mole of EDC which forms NHS activated beta-alanine. This molecule can then react with lysine groups to form beta-alanine adducts (+70 Da). In the EDC/NHS-treated triple mutant toxin B samples, low levels (0.07 moles/mole protein) of dehydroalanine (-34 Da) were also observed. Dehydroalanine is a result of de-sulfonation of a cysteine residue. The same type and degree of modification was observed in all four batches of each mutant toxin, indicating that the process produces a consistent product. Peptide mapping (at greater than 95% sequence coverage) confirms that modifications are present. A summary of the modifications are shown in Table 39. See also Figures 24-25. In addition, the size and charge heterogeneity of the triple mutant toxin A drug substance and of the triple mutant toxin B drug substance increased, as compared to the size and charge heterogeneity of the respective triple mutant toxin A and triple mutant toxin B in the absence of chemical inactivation. As a result, the size-exclusion chromatography (SEC) and anion-exchange chromatography (AEX) profiles had relatively broad peaks (data not shown).

Table 39. Summary of Modifications Observed in Mutant Toxin Drug Substances

Modification	# of Modified Residues	Total # of Residues	Degree of Modification	Moles modified/ mole protein
Mutant toxin A drug substance				
Crosslink	2	313 Asp/Glu	16-40%	0.6
Glycine moiety	8	313 Asp/Glu	10-53%	2.2
Beta Alanine moiety	19	233 Lys	10-60%	4.7
Mutant toxin B drug substance				
Crosslink	3	390 Asp/Glu	11-63%	0.8
Glycine moiety	23	390 Asp/Glu	10-31%	3.9
Beta Alanine moiety	10	156 Lys	12-42%	2.6
dehydroalanine	2	8 Cys	1.0-3.5%	.07

The degree of modification is calculated by dividing the HPLC area of modified peptide by the HPLC area of the native + modified peptide.

Example 39: Drug Product Production

The *C. difficile* immunogenic composition (drug product) contains two active pharmaceutical ingredients (mutant toxin A drug substance and mutant toxin B drug substance):. An exemplary drug product is a lyophilized formulation containing 10 mM Tris buffer pH 7.4, 4.5% (w/w) trehalose dihydrate, and 0.01% (w/v) polysorbate 80, including each of a mutant toxin A drug substance and a mutant toxin B drug substance. See Table 40. The immunogenic composition is prepared for injection by resuspending the lyophilized vaccine either with diluent or with diluent containing Alhydrogel. The placebo will include a sterile normal saline solution for injection (0.9% sodium chloride).

Table 40

Component	Selected
Formulation dosage form	Lyophilized
Antigen dose per 0.5 mL	25, 50, 100 µg of each EDC/NHS-treated triple mutant toxin A (SEQ ID NO: 4) and EDC/NHS-treated triple mutant toxin B (SEQ ID NO: 6)
pH	7.4 ± 0.5
Buffer	10 mM Tris
Stabilizer/Bulking agent	4.5% Trehalose dihydrate (3 – 6%)
Surfactant	0.01% Polysorbate 80 (0.005 – 0.015%)
Container closures	2 mL 13 mm Type 1 flint glass Vial, Blowback, West - Flurotec

Buffer preparation

Water for injection (WFI) is added to a compounding vessel. While mixing, the excipients are added and dissolved until into solution. The pH is measured. If required, the pH is adjusted to 7.4 ± 0.1 with HCl. The solution is diluted to the final weight with WFI then filtered using a 0.22 µm Millipore Express SHC XL150 filter. A pre-filtration bioburden reduction sample is taken prior to filtration. The filtered buffer is sampled for osmolality and pH.

Formulation preparation

The thawed mutant toxin Drug Substances are pooled in the formulation vessel based on the precalculated amounts in the following order of operation: 50% of the target dilution buffer volume to achieve 0.6 mg/mL is added to the vessel first, followed by addition of mutant toxin A drug substance and mixed for 5 minutes at 100 rpm. Mutant toxin B drug substance is then added to the vessel and the solution is further diluted to 0.6 mg/mL dilution point and then mixed for another 5 minutes at 100 rpm. A sample is removed and tested for total mutant toxin concentration. The solution is diluted to 100 percent volume based on the in-process mutant toxin concentration value then mixed for 15 minutes at 100 rpm. The formulated drug product is sampled for pH and bioburden pre-filtration. The formulated drug product is then filtered using a Millipore Express SHC XL150 for overnight storage, or brought to the filling line for sterile filtration.

The formulated bulk is brought to the filling area, sampled for bioburden, and then sterile filtered with two in-series Millipore Express SHC XL150 filters. The formulated bulk is filled into depyrogenated glass vials at a target fill volume of 0.73 mL. The filled vials are partially stoppered and then loaded into the freeze dryer. The lyophilization cycle is executed as shown in Table 41. At the completion of cycle, the lyophilization chamber is back-filled with nitrogen to 0.8 atm and then the stoppers are fully seated. The chamber is unloaded and the vials are capped using flip-off seals.

Table 41. *C. difficile* Drug Product Lyophilization Cycle Set Points

Step	Temperature (°C)	Ramp (minutes)	Soak (minutes)	Pressure
Loading	5°C	N/A	60	-
Freezing 1	-50°C	183	60	-
Annealing	-10°C	133	180	
Freezing 2	-45°C	117	90	
Vacuum Initiation	-45°C	-	60	50
Primary Drying	-30°C	75	3420	50
Secondary Drying	30°C	300	600	50
Storage	5°C	50	-	50

Drug product stability data is summarized in Table 42. The data suggest that the drug product is physically and chemically stable during storage at 2-8°C for at least 3 months or at least 1 month at 25° or 40°C. Under both storage conditions, the level of impurities detected by size exclusion chromatography (SEC) did not change, nor were there changes in *in vitro* antigenicity through the latest timepoints tested.

Table 42: Stability of Lyophilized Drug Product [a]

	Drug Product Formulation 200 µg/mL mutant toxin A drug substance, 200 µg/mL mutant toxin B drug substance, 4.5% Trehalose dihydrate, 0.01% Polysorbate 80, 10mM Tris buffer pH 7.4			
Test	**t=0**	**1 Month@25°C**	**1 Month@40°C**	**3 months @2-8°C**
Appearance before Reconstitution.	White cake essentially free from visible foreign particulate matter	White cake essentially free from visible foreign particulate matter	White cake essentially free from visible foreign particulate matter	White cake essentially free from visible foreign particulate matter
Appearance after Reconstitution.	Clear colorless solution	Clear colorless solution	Clear colorless solution	Clear colorless solution
pH	7.5	7.6	7.6	7.5
Strength by AEX (µg/mL)	• mutant toxin A drug substance 212 • mutant toxin B drug substance 235	• Mutant toxin A drug substance 193 • mutant toxin B drug substance 223	• Mutant toxin A drug substance 191 • Mutant toxin B drug substance 222	• Mutant toxin A drug substance 193 • mutant toxin B drug substance 230
Impurity by SEC	< 2.5%	2.8%	2.8%	2.9%
Characterization by SEC	HMMS: 29.6% Monomer: 68.0%	HMMS: 30.2% Monomer: 67.1%	HMMS: 30.2% Monomer: 67.1%	HMMS: 28.5% Monomer: 68.7%
Moisture	0.5	NA	NA	NA

a Lyophilized DP is reconstituted with 60 mM NaCl diluent for these tests.

Example 40: Vaccine diluents

For saline, 60 mM NaCl is used as a diluent for the lyophilized drug product without any adjuvant to ensure an isotonic solution upon reconstitution.

Alhydrogel: Alhydrogel "85" 2% (Brenntag) is a commercially available Good Manufacturing Practice (GMP) grade product composed of octahedral crystalline sheets of aluminum hydroxide. An exemplary Alhydrogel diluent formulation is shown in Table 43. The exemplary formulation may be used in combination with the drug product described above.

Table 43. Formulation Rationale for Alhydrogel Diluent

Component	Selected
Formulation dosage form	Liquid Suspension
Adjuvant dose per 0.5 mL	0.5 mg Al
pH	6.5 ± 0.5
Buffer	10 mM His
Salt	60 mM NaCl
Container closures	2 mL 13 mm Type 1 Flint Glass Vial, Blowback, West - Flurotec

Studies with the Alhydrogel adjuvant show 100% binding of mutant toxin A drug substance and mutant toxin B drug substance to 1 mg Al/mL Alhydrogel from pH 6.0 to 7.5. Maximum binding of both drug substances was seen at the highest protein concentration tested (300 µg/mL each).

The binding of the proteins to Alhydrogel was also tested with the lyophilized drug product formulation containing 200 µg/mL of each drug substance and Alhydrogel ranging from 0.25 to 1.5 mg/ml. The drug product was reconstituted with diluents containing the varying concentrations of Alhydrogel and the percent of each mutant toxin bound was measured. All tested concentrations of Alhydrogel demonstrated 100% binding of the antigens.

The binding kinetics of the proteins to Alhydrogel at the target dose of mutant toxin A drug substance and mutant toxin B drug substance (200 µg/mL each) were also assessed. The results show that 100% of the mutant toxin drug substances were bound to Alhydrogel throughout the 24-hour RT time course.

CpG 24555 and Alhydrogel: CpG 24555 is a synthetic 21-mer oligodeoxynucleotide (ODN) having a sequence 5-TCG TCG TTTTTC GGT GCT TTT-3 (SEQ ID NO: 48). An exemplary formulation for a combination of CpG 24555 and Alhydrogel diluents is shown in Table 44. The exemplary formulation may be used in combination with the drug product described above.

Table 44: Formulation Rationale for CpG/Alhydrogel Diluent

Component	Selected
Formulation dosage form	Liquid Suspension
Adjuvant dose per 0.5 mL	0.5 mg Al and 1mg cpG
pH	6.5 ± 0.5
Buffer	10 mM His
Salt	60 mM NaCl
Container closures	2 mL 13 mm Type 1 Flint Glass Vial, Blowback, West - Flurotec

ISCOMATRIX®: The ISCOMATRIX® adjuvant is a saponin-based adjuvant known in the art. An exemplary formulation for the ISCOMATRIX® adjuvant formulation is shown in Table 45. The exemplary formulation may be used in combination with the drug product described above.

Table 45: Formulation Rationale for ISCOMATRIX® Diluent

Component	Selected
Formulation dosage form	Liquid Suspension
Adjuvant dose per 0.5 mL	45units
pH	6.2 ± 0.5
Buffer	10 mM phosphate
Salt	60 mM NaCl
Container closures	2 mL 13 mm Type 1 Flint Glass Vial, Blowback, West - Flurotec

Example 41: Immunogenicity of Mutant Toxin Drug Substance Compositions Adjuvanted with Alhydrogel in NHP Model and Preclinical Proof of Concept

The immunogenicity of mutant toxin A drug substance and mutant toxin B drug substance compositions adjuvanted with Alhydrogel in NHPs was assessed, specifically cynomolgus macaques. NHPs immunized at two-week intervals (weeks 0, 2, 4) with 10µg of each mutant toxin A drug substance and mutant toxin B drug substance compositions (formulated with Alhydrogel) per dose, developed robust neutralizing antitoxin responses. See Table 46. Both antitoxin A and antitoxin B neutralizing responses reached a protective range after the third immunization and remained within or above the protective range at least through week 33 (last timepoint studied).

Cynomolgus macaques (n=8) were immunized IM at 0, 2 and 4 weeks with 10 µg each of mutant toxin A drug substance and mutant toxin B drug substance formulated in 250 µg of Alhydrogel. Sera was collected at each time point and analyzed in the toxin neutralization assay for functional antitoxin activity. GMTs are provided in Table 46. The protective titer range provided in the table depicts the neutralizing antibody titer range which correlates to significant reduction in recurrence of *C. difficile* infection in the Merck monoclonal antibody therapy trial.

Table 46: Immunogenicity of Mutant Toxin A Drug Substance and Mutant Toxin B Drug Substance (Formulated in 250 µg Alhydrogel) in Cynomolgus Monkeys (50% Neutralization Titer)

Antitoxin A (Merck/Medarex protective range: 666- 6,667 for antitoxin A)

Week:	**Wk 0**	**Wk 1**	**Wk 2**	**Wk 3**	**Wk 4**	**Wk 5**	**Wk 6**	**Wk 8**	**Wk 12**	**Wk 25**	**Wk 29**	**Wk 33**
Titer:	15	19	129	382	336	2469	3069	2171	1599	1520	1545	2178

Antitoxin B (Merck/Medarex protective range: 222- 2,222 for antitoxin B)

Titer:	10	10	10	10	20	311	410	446	676	1631	2970	3510

Correlation of Human Protective Antibody Titers from Merck mAb Therapy Trial to Titers Induced by Pfizer's Vaccine Candidate in NHPs

The Phase 2 efficacy study with Merck/Medarex mAbs (Lowy et al., *N Engl J Med.* 2010 Jan 21;362(3):197-205) seemed to demonstrate a correlation between the level of neutralizing antitoxin mAbs in the serum and the prevention of recurrence of CDAD. After administration of the toxin-specific mAbs to humans, serum antibody levels in human recipients in the range of 10 to 100 µg/mL appear to protect against recurrences (70% reduction in the recurrence of CDAD).

Immunogenic compositions including the mutant toxin drug substances were tested to gauge whether the immunogenic compositions are capable of inducing a potentially efficacious neutralizing antibody responses in humans by comparing published data from the Merck/Medarex Phase 2 study to the levels of antibody induced by the immunogenic compositions in the NHP model. This was accomplished by utilizing previously published characteristics of the Merck/Medarex mAbs to convert the range of these mAbs in the serum obtained from subjects that displayed no sign of recurrences (10-100 µg/mL) into 50% neutralization titers and comparing these titers ("protective titer range") to the titers observed in the preclinical models described herein. As shown in Table 46, the immunogenic compositions including the mutant toxin A drug substance and mutant toxin B drug substance adjuvanted with Alhydrogel generated immune responses in NHPs that reached the "protective range" after the third dose and have remained within or above this range through week 33. The level of toxin-neutralizing antibodies induced in NHPs by the inventive *C. difficile* immunogenic composition is comparable to the serum antibody levels in the Merck/Medarex trial subjects who appeared to be protected from recurrences of CDAD.

Example 42: Immunogenicity of Mutant Toxin Drug Substance Compositions Adjuvanted with ISCOMATRIX or Alhydrogel/CpG 24555 (Alh/CpG) in NHP Model

In NHPs, both ISCOMATRIX and Alh/CpG statistically significantly enhanced antitoxin A and B neutralization titers when compared to vaccine administered with Alhydrogel alone (Table 47). Antitoxin responses above background were elicited at earlier time points by vaccine administered with either Alh/CpG or ISCOMATRIX (week 2-4) as compared to Alhydrogel alone (week 4-6), which may have an important effect on protection from recurrence of CDAD in humans. Compared to Alhydrogel, the immunogenic composition adjuvanted with Alh/CpG or with ISCOMATRIX generated antitoxin neutralization titers that reached the protective range (see also Example 41) more swiftly and that have remained within or above this range through week 33.

As shown in Table 47, Cynomolgus macaques were immunized IM at weeks 0, 2, and 4 with 10µg each of mutant toxin A drug substance and mutant toxin B drug substance formulated in 250µg of Alhydrogel (n=8), or 500 µg of CpG + 250 µg of Alhydrogel (n=10), or 45 U of ISCOMATRIX (n=10). Sera were collected at each time point and analyzed in the toxin neutralization assay described above for functional antitoxin activity. GMTs are listed in the tables. Asterisks (*) indicate statistical significance ($p<0.05$) when compared to titers in the Alhydrogel group. The protective titer range represents the neutralizing antibody titer range which correlates to significant reduction in recurrence of *C. difficile* infection according to the Merck/Medarex mAb therapy trial.

Table 47: Immunogenicity of Adjuvanted Mutant Toxin Drug Substances in NHPs (50% Neutralization Titer)

Antitoxin A (Merck/Medarex protective range: 666- 6,667 for antitoxin A)

Week:	**Wk 0**	**Wk 2**	**Wk 4**	**Wk 6**	**Wk 12**	**Wk 25**	**Wk 33**
Alhydrogel Titer:	15	129	336	3069	1599	1520	2178
Alhydrogel + CpG Titer:	17	*1004	*2162	*15989	*7179	*5049	*7023
ISCOMATRIX Titer:	25	*1283	*3835	*19511	*12904	*6992	*7971
Antitoxin B (Merck/Medarex protective range: 222- 2,222 for antitoxin B)							
Alhydrogel Titer:	10	10	20	410	676	1631	3510
Alhydrogel + CpG Titer:	10	13	*136	*2163	*5076	*9057	*27971
ISCOMATRIX Titer:	10	10	*269	*5325	*9161	*19479	*25119

The dose of mutant toxin A drug substance and mutant toxin B drug substance administered, in the presence of ISCOMATRIX or Alh/CpG adjuvants, on neutralizing antitoxin antibody titers generated in NHPs was also evaluated. In one study, NHPs were administered a low (10μg) or a high (100μg) dose of each mutant toxin drug substance formulated in ISCOMATRIX. Responses were compared at each time point after immunization. As shown in Table 48, antitoxin neutralization titers were robust in both treatment groups. The antitoxin A titers were nearly equivalent at most time points between the low dose and high dose groups, while there was a trend for the antitoxin B titers to be higher in the high dose group.

Table 48: Neutralizing Antitoxin Titers in NHPs Following Immunization with Either 10µg or 100µg of Each of Mutant Toxin Drug Substance and Mutant Toxin Drug Substance Administered with ISCOMATRIX (50% Neutralization Titer)

Antitoxin A (Merck/Medarex protective range: 666- 6,667 for antitoxin A)

Week	**Wk 0**	**Wk 2**	**Wk 3**	**Wk 4**	**Wk 6**	**Wk 8**	**Wk 12**
10µg Titer:	11	585	3522	4519	19280	10225	12084
100 µg Titer:	11	400	1212	2512	9944	10283	18337
Antitoxin B (Merck/Medarex protective range: 222- 2,222 for antitoxin B)							
10µg Titer:	10	10	112	266	3710	2666	7060
100 µg Titer:	10	10	303	469	6016	4743	20683

As shown in Table 48, Cynomolgus macaques (n=5) were immunized IM at weeks 0, 2, and 4 with 10 µg or 100 µg each of mutant toxin A drug substance and mutant toxin B drug substance formulated with 45U of ISCOMATRIX. Sera were collected at each time point and analyzed in the toxin neutralization assay for functional antitoxin activity. GMTs are listed in the table. The protective titer range represents the neutralizing antibody titer range which correlates to significant reduction in recurrence of *C. difficile* infection in the Merck/Medarex mAb therapy trial.

In an effort to enhance the kinetics of antitoxin B responses, NHPs were immunized with a constant dose of mutant toxin A drug substance (10 µg) that was mixed with an increasing dose of mutant toxin B drug substance (10, 50, or 100 µg) in the presence of ISCOMATRIX or Alh/CpG adjuvants. Regardless of adjuvant, there was a trend for groups that received higher doses of mutant toxin B drug substance (either 50 or 100 µg) to induce higher antitoxin B neutralizing responses in comparison to the 10 µg dose of mutant toxin B drug (Table 50, marked by * to indicate statistically significant increases). This trend was observed at most time points after the final immunization. However, in some cases, antitoxin A neutralizing responses showed a statistically significant decrease (marked by ^ in Table 49) when the amount of mutant toxin B was increased.

As shown in Table 49 and Table 50, NHPs (10 per group) were immunized IM at weeks 0, 2, and 4 with different ratios of mutant toxin A drug substance and mutant toxin B drug substance (10µg of mutant toxin A drug substance plus either 10, 50, or 100 µg of mutant toxin B drug substance; designated 10A:10B, 10A:50B and 10A:100B, respectively, in Table 49 and Table 50), formulated with ISCOMATRIX (45U per dose) or with Alh/CpG/ (250 µg / 500 µg per dose). Table 49 shows Antitoxin A titers. Table 50 shows Antitoxin B titers. GMTs are listed in the tables. The protective titer range represents the neutralizing antibody titer range which correlates to significant reduction in recurrence of *C. difficile* infection in the Merck mAb therapy trial. The symbol **^**, represents statistically significant decrease in neutralizing titers ($p<0.05$) compared to the 10A: 10B group. The asterisk symbol, *, represents statistically significant increase in neutralizing titers ($p<0.05$) compared to the 10A: 10B group.

Table 49: Neutralizing Antitoxin Titers in NHPs Following Immunization with 10µg Mutant Toxin A Drug Substance Combined with 10, 50, or 100 µg Mutant Toxin B Drug Substance using ISCOMATRIX or Alh/CpG as Adjuvants (50% Neutralization Titer)

Antitoxin A (Merck/Medarex protective range: 666- 6,667 for antitoxin A)
ISCOMATRIX

Week:	**Wk 0**	**Wk 2**	**Wk 4**	**Wk 6**	**Wk 12**	**Wk 25**	**Wk 33**
10A:10B Titer:	25	1283	3835	19511	12904	6992	7971
10A:50B Titer:	29	906	2917	16126	^7756	^4208	5965
10A:100B Titer:	20	982	2310	^5034	^5469	^4007	3780
Antitoxin A (Merck/Medarex protective range: 666- 6,667 for antitoxin A) **Alh/CpG**							
10A:10B Titer:	17	1004	2162	15989	7179	5049	7023
10A:50B Titer:	20	460	1728	16600	6693	6173	8074
10A:100B Titer:	27	^415	1595	13601	6465	5039	6153

Table 50: Neutralizing Antitoxin Titers in NHPs Following Immunization with 10µg Mutant Toxin A Drug Substance Combined with 10, 50, or 100 µg Mutant Toxin B Drug Substance using ISCOMATRIX or Alh/CpG as Adjuvants (50% Neutralization Titer)

Antitoxin B (Merck/Medarex protective range: 222- 2,222 for antitoxin B)

Week:	**Wk 0**	**Wk 2**	**Wk 4**	**Wk 6**	**Wk 12**	**Wk 25**	**Wk 33**
ISCOMATRIX Titer:	10	10	269	5325	9161	19479	25119
Titer:	13	*20	*604	4861	10801	20186	*57565
Titer:	10	*23	*862	*10658	10639	*33725	*56073
Antitoxin B (Merck/Medarex protective range: 222- 2,222 for antitoxin B)							
Alh/CpG Titer:	10	13	136	2163	5076	9057	27971
Titer:	10	15	*450	*5542	*9843	15112	50316
Titer:	11	17	*775	*13533	*11708	*17487	26600

Example 43: Five-Week Repeat-Dose IM Toxicity Study with an Immunogenic Composition in Cynomolgus Monkeys, with a 4-Week Recovery Period

The 5-week IM repeat-dose toxicity study with PF-06425095 (an immunogenic composition including triple mutant toxin A drug substance and triple mutant toxin B drug substance in a combination with adjuvants aluminum hydroxide and CpG 24555) in Cynomolgus monkeys was conducted to assess the potential toxicity and immunogenicity of *C. difficile* triple mutant toxin A drug substance and triple mutant toxin B drug substance in a combination with the adjuvants aluminum hydroxide and CpG 24555 (PF-06425095). PF-06425095 at 0.2 or 0.4 mg/dose triple mutant toxin A drug substance and triple mutant toxin B drug substance (low- and high-dose immunogenic composition groups, respectively), 0.5 mg aluminum as aluminum hydroxide, and 1 mg CpG 24555 and the adjuvant combination alone (aluminum hydroxide + CpG 24555; PF-06376915) were administered IM to cynomolgus monkeys (6/sex/group) as a prime dose followed by 3 booster doses (Days 1, 8, 22, and 36). A separate group of animals (6/sex) received 0.9% isotonic saline at an approximate pH of 7.0. The immunogenic composition vehicle was composed of 10 mM Tris buffer at pH 7.4, 4.5% trehalose dihydrate, and 0.1% polysorbate 80. The adjuvant control vehicle was composed of 10 mM histidine buffer with 60 nM NaCl at pH 6.5. The total dose volume was 0.5 mL per injection. All doses were administered into the left and/or right quardriceps muscle. Selected animals underwent a 4-week dose-free observation period to assess for reversibility of any effects observed during the dosing phase of the study.

There were no adverse findings in this study. PF-06425095 was well-tolerated and produced only local inflammatory reaction without evidence of systemic toxicity. During the dosing phase, dose-dependent increases from pretest in fibrinogen (23.1% to 2.3x) on Days 4 and 38 and C-reactive protein on Days 4 (2.1x to 27.5x) and 38 (2.3x to 101.5x), and globulin (11.1% to 24.1%) on Day 36 and/or 38, were seen in immunogenic composition-treated groups and were consistent with the expected inflammatory response to administration of an adjuvanted immunogenic composition.

The increases in fibrinogen and C-reactive protein noted on Day 4 had partially recovered by Day 8 with increases in fibrinogen (25.6% to 65.5%) and C-reactive protein (4.5x and 5.6x) in the high-dose immunogenic composition group only. Increases in interleukin (IL)-6 were observed in the low- and high-dose immunogenic composition groups on Day 1, Hour 3 (8.3x to 127.2x individual values Day 1, Hour 0, dose responsive) and Day 36, Hour 3 (9.4x to 39.5x individual values Day 36, Hour 0). There were no changes observed in the other cytokines (IL-10, IL-12, Interferon-Inducible Protein (IP-10), and Tumor Necrosis Factor α (TNF-α). Increases in these acute phase proteins and cytokine were part of the expected normal physiologic response to the administration of foreign antigen. There were no PF 06425095-related or adjuvant-related alterations in these clinical pathology parameters in the recovery phase (cytokines were not evaluated during the recovery phase). In addition, there were localized changes at the injection sites, which were of similar incidence and severity in the adjuvant control group and the low- and high-dose immunogenic composition groups; hence, they were not directly related to PF-06425095. During the dosing phase, the changes included minimal to moderate chronic-active inflammation that was characterized by separation of muscle fibers by infiltrates of macrophages, which often contained basophilic granular material (interpreted as aluminum-containing adjuvant), lymphocytes, plasma cells, neutrophils, eosinophils, necrotic debris, and edema. The basophilic granular material was also present extracellularly within these foci of chronic-active inflammation. At the end of the recovery phase, there was minimal to moderate chronic inflammation and mononuclear cell infiltrate, and minimal fibrosis. These injection site findings represent a local inflammatory response to the adjuvant. Other microscopic changes included minimal to moderate increased lymphoid cellularity in the iliac (draining) lymph node and minimal increased cellularity in germinal centers in the spleen that were noted during the dosing phase in the adjuvant control group and the low- and high-dose immunogenic composition groups. At the end of the recovery phase, these microscopic findings were of lower severity. These effects represent an immunologic response to antigenic stimulation, and were a pharmacologic response to the adjuvant or PF-06425095. There was no test article-related increase in anti-DNA antibodies.

Based on absence of adverse findings, the no observed adverse effect level (NOAEL) in this study is the high-dose immunogenic composition group (0.4 mg of triple mutant toxin A drug substance and triple mutant toxin B drug substance/dose as PF-06425095) administered as two 0.5 mL injections for four doses.

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Example 44: Efficacy of Seropositive NHP Sera Passively Transferred to Hamsters

Groups of 5 Syrian golden hamsters were administered an oral dose of clindamycin antibiotic (30 mg/kg) to disrupt normal intestinal flora. After five days, the hamsters were challenged with an oral dose of wild type *C. difficile* spores (630 strain, 100 cfu per animal), and administered intraperitoneally (IP) with NHP sera according to Table 51. Without being bound by mechanism or theory, disease symptoms following challenge with the spores typically manifest beginning about 30-48 hours post-challenge.

The NHP sera that were administered to the hamsters were pooled from NHP serum samples exhibiting the highest titer (anti-toxin A sera and anti-toxin B sera) following three immunizations with mutant toxin A drug substance and mutant toxin B drug substance (10:10, 10:50, and 10:100 A:B ratios), formulated with ISCOMATRIX (see Example 42, Table 49, and Table 50). The NHP sera were collected from timepoints at weeks 5, 6, and 8 (immunizations occurred at weeks 0, 2, and 4), as described in Examine 42. Results are shown in Tables 52-54 below. The symbol "+" indicates a Geometric mean (GM) in () that does not include animal #3, non-responder. "*TB" represents terminal bleed, the day the animal was euthanized, which is not the same for all animals.

Table 51: Experimental design

Group	Administered composition	No. animals	Route	Schedule
1 "1 dose"	Seropositive NHP sera (unconcentrated)	5	IP	Challenge Day 0 Dose day 0 Bleed days 0, 1, 2, TB on day11
2 "2 dose"	Seropositive NHP sera (unconcentrated)	5	IP	Challenge Day 0 Dose days 0, 1 Bleed days 0, 1, 2, TB on day11

Table 52: Anti-toxin A Neutralization Titers in Hamster Sera Following 1 or 2 IP doses of NHP Sera (50% Neutralization Titer in RLU)

	Day	Hamster 1	Hamster 2	Hamster 3	Hamster 4	Hamster 5	GM	SE
1 dose	D0	50	50	50	50	50	**50**	0
	D1	2877	4008	2617	4917	1872	**3081**	538
	D2	1983	3009	2750	2902	1117	**2214**	357
	TB*	3239 (d4)	537 (d9)	155 (d11)	977 (d9)	972 (d2)	**762**	538
2 dose	D0	50	50	50	50	50	**50**	0
	D1	1154	2819	50	429	1174	**606 (1131)+**	475
	D2	4119	4674	1899	545		**2113**	862
	TB*	1236 (d9)	1267 (d8)	1493 (d4)	50 (d11)	1877 (d9)	**738**	306

Input NHP sera = 41976

Table 53: Anti-toxin B Neutralization Titers in Hamster Sera Following 1 or 2 IP doses of NHP Sera (50% Neutralization Titer in RLU)								
	Day	Hamster 1	Hamster 2	Hamster 3	Hamster 4	Hamster 5	GM	SE
1 dose	D0	50	50	50	50	50	**50**	0
	D1	1846	4254	1347	5178	406	**1859**	904
	D2	992	1795	2585	2459	1145	**1669**	327
	TB*	1744 (d4)	50 (d9)	50 (d11)	265 (d9)	544 (d2)	**229**	317
2 dose	D0	50	50	50	50	50	**50**	0
	D1	1189	2229	50	550	3920	**778 (1546)+**	687
	D2	2288	2706	1452	287		**1268**	477
	TB*	301 (d9)	694 (d8)	682 (d4)	50 (d11)	1334 (d9)	**394**	217
Input NHP sera = 23633								

Table 54: Percentage of hamsters protected from severe CDAD following 1 or 2 IP doses of NHP sera							
Days post-infection	0	2	4	6	8	10	11
1 dose NHP Sera	100%	80%	60%	60%	60%	20%	20%
2 dose NHP Sera	100%	100%	80%	80%	60%	20%	20%
Placebo	100%	75%	50%	25%	0%	n/a	n/a

In another study, Syrian golden hamsters were administered an oral dose of clindamycin antibiotic (30 mg/kg) to disrupt normal intestinal flora. After five days, the hamsters were challenged with an oral dose of wild type *C. difficile* spores (630 strain, 100 cfu per animal), and administered intraperitoneally (IP) NHP sera according to Table 55. Without being bound by mechanism or theory, disease symptoms following challenge with the spores typically manifest beginning about 30-48 hours post-challenge.

The NHP sera that were administered to the hamsters were pooled from samples collected from NHPs following three immunizations with mutant toxin A drug substance and mutant toxin B drug substance (10:10, 10:50, and 10:100 A:B ratios), formulated with Alhydrogel and CpG 24555 (see Example 42, Table 49, and Table 50). The NHP sera were collected from timepoints at weeks 5, 6, 8, and 12 as described in Examine 42 (NHPs were immunized on weeks 0, 2, and 4). Results are shown in Tables 56-59 below. Sera from the hamsters were further investigated to determine inhibitory concentration (IC_{50}) value, which were determined using the toxin neutralization assay described above. The level of toxin-neutralizing antibodies induced in hamsters by the inventive *C. difficile* immunogenic composition is comparable to the serum antibody levels in the Merck/Medarex trial subjects who appeared to be protected from recurrences of CDAD.

Table 55: Experimental Design

Group	Administered Composition	No.	Route	Schedule
1	Seropositive NHP sera	5	IP	Challenge D0 Dose D0, 1, 3, 5, 7
2	Seropositive NHP sera	5	IP	no challenge Dose D0, 1, 3, 5, 7,
3	Seropositive NHP sera	10	IP	Challenge D0 Dose D0, 1, 3, 5, 7
4	Placebo	5	IM	Challenge D0

Table 56: Anti-toxin A Neutralization Titers[a] in Hamster Sera Following 1 or 2 IP doses of NHP Sera (50% Neutralization Titer in RLU)			
Day	**Challenged (Groups 1 and 3)**	**Not Challenged (Group 2)**	**p Value**
0	11	12	0.5933
1	380	720	0.034*
3	666	1220	0.0256*
5	864	1367	0.0391*
7	564	1688	0.0411*
11	263	1281	0.001*
Input NHP sera pool = 9680 a, titers expressed as geometric means for each group (n=15 at day 0 for "challenged" group, n=5 for "not challenged" group) Merck/Medarex protective range: 666- 6,667 for antitoxin A The asterisk "*" indicates a significant difference.			

Table 57: Anti-toxin B Neutralization Titers[a] in Hamster Sera Following 1 or 2 IP doses of NHP Sera (50% Neutralization Titer in RLU)			
Day	**Challenged (Groups 1 and 3)**	**Not Challenged (Group 2)**	**p Value**
0	10	10	0.3343
1	465	828	0.0579
3	765	1400	0.0273*
5	941	1734	0.0226*
7	611	1877	0.0498*
11	194	1436	0.0047*
Input NHP sera pool = 19631 a, titers expressed as geometric means for each group (n=15 at day 0 for "challenged" group, n=5 for "not challenged" group) Merck/Medarex protective range: 222- 2,222 for antitoxin B The asterisk "*" indicates a significant difference.			

Table 58: Percentage of hamsters protected from severe CDAD following IP dose of NHP sera							
Days post-infection	0	2	4	6	8	10	11
Groups 1 and 3	100%	73%	53%	53%	47%	33%	33%
Placebo (Group 2)	100%	50%	0%				

Table 59: IC_{50} values from Toxin-specific 50% Neutralization Titers														
		IC_{50} of Anti Toxin A							**IC_{50} of Anti Toxin B**					
		Day of Post Dose							**Day of Post Dose**					
	Animal ID	0	1	3	5	7	11	Animal ID	0	1	3	5	7	11
	1-1	10	50	338	died D4			1-1	10	50	254	died D4		
	1-2	10	614	579	777	605	192	1-2	10	720	659	896	475	157
	1-3	10	710	1035	845	548	Died D10	1-3	10	867	1017	988	694	
	1-4	10	850	588	942	1116	296	1-4	10	1158	555	1158	1806	250
	1-5	10	780	895*				1-5	10	910	687*			
	3-1	10	647	Died D2				3-1	10	598	Died D2			
	3-2	10	331	Died D2				3-2	10	290	Died D2			
Challenged	3-3	10	660	1273	849	692	640	3-3	10	717	1623	870	791	574
	3-4	10	536	493	1102	1314	Died D9	3-4	10	618	598	977	1478	Died D9
	3-5	10	817	807	774	1077	187	3-5	10	772	1260	850	913	243
	3-6	10	117	649	803	50	186	3-6	10	1038	773	883	50	50
	3-7	10	50	Died D2				3-7	10	50	Died D2			
	3-8	10	149	659	650*			3-8	10	121	1010	517*		
	3-9	30	797	1170*				3-9	10	1008	1720*			
	3-10	10	792	Died D2				3-10	10	835	Died D2			
	GeoMean	**11**	**380**	**666**	**864**	**564**	**263**	GeoMean	**10**	**465**	**765**	**941**	**611**	**194**
	Std Error	**1**	**78**	**86**	**41**	**163**	**88**	Std Error	**0**	**94**	**125**	**38**	**224**	**88**
	2-1	10	697	1634	1597	2219	1709	2-1	10	890	1777	1910	3229	1355
	2-2	10	779	1207	1322	1755	1327	2-2	10	939	1378	1564	1897	1379
Not	2-3	10	581	669	722	1401	1118	2-3	10	828	837	865	1484	1404
Challenged	2-4	26	856	1540	1875	1830	1826	2-4	10	748	1780	2939	1880	2650

	2-5	10	715	1331	1668	1374	744	2-5	10	752	1475	2064	1364	880
	GeoMean	**12**	**720**	**1220**	**1367**	**1688**	**1281**	GeoMean	**10**	**828**	**1400**	**1734**	**1877**	**1436**
	Std Error	**3**	**46**	**169**	**199**	**156**	**197**	Std Error	**0**	**38**	**173**	**338**	**332**	**296**
*= deceased on that day														

Example 45: Characterization of Mutant Toxin Drug Substances

The primary structure of triple mutant toxin A is shown in SEQ ID NO: 4. The NH_2-terminal Met residue at position 1 of SEQ ID NO: 4 is originated from the initiation codon of SEQ ID NO: 12 and is absent in isolated protein (e.g., see SEQ ID NO: 84). Accordingly, in Example 12 to Example 45, "SEQ ID NO: 4" refers to SEQ ID NO: 4 wherein the initial methionine (at position 1) is absent. Both purified triple mutant toxin A (SEQ ID NO: 4) (Drug Substance Intermediate - Lot L44993-132) and EDC/NHS treated triple mutant toxin A (SEQ ID NO: 4)("mutant toxin A Drug Substance" - Lot L44898-012) displayed a single NH_2-terminal sequence starting at SLISKEELIKLAYSI (positions 2-16 of SEQ ID NO: 4).

The primary structure of triple mutant toxin B is shown in SEQ ID NO: 6. The NH_2-terminal Met residue at position 1 of SEQ ID NO: 6 is originating from the initiation codon and is absent in isolated protein (e.g., see SEQ ID NO: 86). Accordingly, in Example 12 to Example 45, "SEQ ID NO: 6" refers to SEQ ID NO: 6 wherein the initial methionine (at position 1) is absent. Both purified triple mutant toxin B (SEQ ID NO: 6) (Drug Substance Intermediate - Lot 010) and EDC/NHS treated triple mutant toxin B (SEQ ID NO: 6)("mutant toxin B Drug Substance" - Lot L44906-153) displayed a single NH_2-terminal sequence starting at SLVNRKQLEKMANVR (positions 2-16 of SEQ ID NO: 6).

Circular dichroism (CD) spectroscopy was used to assess secondary and tertiary structure of triple mutant A (SEQ ID NO: 4) and mutant toxin A drug substance. CD spectroscopy was also used to assess secondary and tertiary structure of the triple mutant toxin B (SEQ ID NO: 6) and the mutant toxin B drug substance. CD spectroscopy was also used to assess potential effects of pH on structure. The effect of EDC treatment on triple mutant toxin A was analyzed by comparing CD data obtained for mutant toxin A drug substance to the data obtained for triple mutant toxin A. The effects of EDC treatment on triple mutant toxin B (SEQ ID NO: 6) were analyzed by comparing CD data obtained for mutant toxin B drug substance to the data obtained for triple mutant toxin B.

Mutant toxin A drug substance far-UV CD data were obtained at various pH. Spectra recorded at pH 5.0-7.0 are indicative of high proportion of α-helices in the secondary structure, suggesting that polypeptide backbone of the protein adopts well-defined conformation dominated by α-helices.

Near-UV CD spectra of mutant toxin A drug substance were also obtained. Strong negative ellipticity between 260 and 300 nm is an indication that aromatic side chains are in the unique rigid environment, i.e. mutant toxin A drug substance possesses tertiary structure. In fact, characteristic features arising from individual types of aromatic side chains can be distinguished within the spectrum: shoulder at ~290 nm and largest negative peak at ~283 nm are due to absorbance of the polarized light by ordered tryptophan side chains, negative peak at 276 nm is from the tyrosine side chains, and minor shoulders at 262 and 268 nm are indicative of the phenylalanine residues participating in tertiary contacts. Far- and near-UV results provide evidence that mutant toxin A drug substance retains compactly folded structure at physiological pH. Nearly identical far- and near-UV CD spectra observed at pH 5.0 - 7.0 indicate that no detectable structural changes are taking place within this pH range. CD data could not be collected at pH 3.0 and 4.0, since the protein was insoluble at these pH points.In comparing far- and near-UV CD spectra of mutant toxin A drug substance with those of the triple mutant toxin A, spectra of both proteins are essentially identical under all of the experimental conditions studied, indicating that EDC treatment had no detectable effects on secondary and tertiary structure of the triple mutant toxin A. This finding is in agreement with the gel-filtration and analytical ultracentrifugation results, which show no detectable changes in Stokes radii and sedimentation/frictional coefficients, respectively.

Mutant toxin A drug substance (as well as triple mutant toxin A) contains 25 tryptophan residues that are spread throughout the primary sequence and can serve as convenient intrinsic fluorescence probes. Fluorescence emission spectra of mutant toxin A drug substance between 300 and 400 nm as a function of temperature were obtained. At 6.8°C mutant toxin A drug substance shows characteristic tryptophan fluorescence emission spectrum upon excitation at 280 nm. Fluorescence emission maximum is observed at ~335 nm, indicating that tryptophan residues are in non-polar environment, typical of protein interiors rather than of polar aqueous environments. The fluorescence emission spectra results, together with the results of the CD experiments presented in this report, confirm that mutant toxin A drug substance retains compact folded structure.

Fluorescence of the extrinsic probe 8-anilino-1-naphtalene sulfonic acid (ANS) was used to characterize possible conformational changes in mutant toxin A drug substance and triple mutant toxin A upon changes in pH. As can be seen from the results, there is essentially no increase in ANS fluorescence intensity when either mutant toxin A drug substance or triple mutant toxin A are titrated with the probe at pH 7.0, suggesting that no hydrophobic surfaces are exposed on the proteins under these conditions. Shifting pH to 2.6 leads to a dramatic increase in ANS fluorescence quantum yield upon increase in probe's concentration, until fluorescence quantum yield reaches apparent saturation. This increase in ANS fluorescence quantum yield indicates that at low pH (2.6), both mutant toxin A drug substance and triple mutant toxin A undergo pH-induced conformational change that exposes hydrophobic surfaces. Such conformational changes indicate that EDC-induced modification and inactivation of triple mutant toxin A did not restrict conformational plasticity of mutant toxin A drug substance (DS).

Effect of EDC treatment on hydrodynamic properties of triple mutant toxin A was evaluated using size-exclusion chromatography on a G4000 SWXL column. Mutant toxin A drug substance and triple mutant toxin A were injected onto the G4000 SWXL column equilibrated at pH 7.0, 6.0, and 5.0. The data indicate that no differences in the Stoke's radius of mutant toxin A drug substance and triple mutant toxin A can be detected using size exclusion chromatography. Therefore, EDC treatment has not dramatically affected hydrodynamic properties and, correspondingly, overall molecular shape of the triple mutant toxin A.

Further analysis of triple mutant toxin A and mutant toxin A drug substance was performed using multi-angle laser light scattering (MALLS) technique. Treatment of triple mutant toxin A with EDC resulted in generation of heterogeneous mixture composed of various multimeric and monomeric species. Such heterogeneity reflects introduction of a large number of EDC-induced inter- and intra-molecular covalent bonds between carboxyls and primary amines of the protein.

Obtained data provide physical and chemical characteristics of triple mutant toxin A andmutant toxin A drug substance (triple mutant toxin A treated with EDC) and describe the key features of their primary, secondary, and tertiary structure. Generated data demonstrate that treatment of triple mutant toxin A with EDC resulted in covalent modification of its polypeptide chain but did not affect secondary and tertiary structures of the protein. Treatment with EDC leads to intra- and intermolecular cross-linking. The biochemical and biophysical parameters obtained for mutant toxin A drug substance (as well as triple mutant toxin A) are presented in Table 60.

Table 60: Major Biochemical and Biophysical Parameters Obtained for Triple Mutant Toxin A (SEQ ID NO: 4) and Mutant Toxin A Drug Substance		
Parameter	**Triple Mutant toxin A (SEQ ID NO: 4)**	**Mutant Toxin A Drug Substance**
Number of amino acid residues	2709	2709
N-terminal sequence	SLISKEELIKLAYSI (positions 2-16 of SEQ ID NO: 4)	SLISKEELIKLAYSI (positions 2-16 of SEQ ID NO: 4)
Mol mass (from AA sequence)	308 kDa	308 kDa
Mol mass (from SEC-MALLS)	299 kDa	300 kDa and 718 -1139 kDa
Extinction coefficient at 280 nm	1.292 or 1.275 $(mg/ml)^{-1}cm^{-1}$	1.292 or 1.275 275 $(mg/ml)^{-1}cm^{-1}$
Theoretical pI	5.57	ND
Partial specific mol volume at 20 °C	0.735 cm^3/g	0.735 cm^3/g
Anhydrous volume/monomer	$3.8x10^{-19}cm^3$	$3.8x10^{-19}cm^3$
Sedimentation coefficient/monomer	9.2S	9.2S
Frictional coefficient ratio (f/f_0)	1.69	1.69
Stokes radius /monomer	78.4±1.1	77.9
Fluorescence max (λex = 280 nm)	334-335 nm	334-335 nm
Near-UV CD spectrum minima	284 nm and 278 nm	284 nm and 278 nm
Mean res ellipticity at 284 & 278 nm	-138±7 & -130±7	-138±8 & 131±10
Mean res ellipticity at 222 nm	-8989±277	-7950±230
DSC unfolding transitions maxima (PBS, pH 7.4)	47.3 °C and 53.6 °C	47.9±0.2 °C and 54.1±0.2 °C

Mutant toxin B drug substance far-UV CD data were obtained at various pH. Spectra recorded at pH 5.0-7.0 are indicative of high proportion of α-helices in the secondary structure, suggesting that polypeptide backbone of the protein adopts well-defined conformation dominated by α-helices.

Near-UV CD spectra of mutant toxin B drug substance were also obtained. Strong negative ellipticity between 260 and 300 nm is an indication that aromatic side chains are in the unique rigid environment, i.e. mutant toxin B drug substance possesses tertiary structure. In fact, characteristic features arising from individual types of aromatic side chains can be distinguished within the spectrum: shoulder at ~290 nm and largest negative peak at ~283 nm are due to absorbance of the polarized light by ordered tryptophan side chains, negative peak at 276 nm is from the tyrosine side chains, and minor shoulders at 262 and 268 nm are indicative of the phenylalanine residues participating in tertiary contacts. Far- and near-UV CD spectra provide evidence that mutant toxin B drug substance retains compactly folded structure at physiological pH. Very similar far- and near-UV CD spectra observed at pH 5.0 - 7.0 indicate that no detectable secondary or tertiary structural changes are taking place within this pH range. CD data could not be collected at pH 3.0 and 4.0, since the protein was insoluble at these pH points.

In comparing far- and near-UV CD spectra of mutant toxin B drug substance with those of the triple mutant toxin B, spectra of both proteins are very similar between pH 5.0 and 7.0, indicating that EDC treatment had no detectable effects on secondary and tertiary structure of the protein.

Triple mutant toxin B contains 16 tryptophan residues that are spread throughout the primary sequence and can serve as convenient intrinsic fluorescence probes. Fluorescence emission spectra of mutant toxin B drug substance between 300 and 400 nm as a function of temperature were obtained. At 7°C mutant toxin B drug substance shows characteristic tryptophan fluorescence emission spectrum upon excitation at 280 nm. Fluorescence emission maximum is observed at ~335 nm, indicating that tryptophan residues are in non-polar environment, typical of protein interiors rather than of polar aqueous environments. This result, together with the results of the CD experiments (see above), confirm that mutant toxin B drug substance retains compact folded structure.

Fluorescence of the extrinsic probe 8-anilino-1-naphtalene sulfonic acid (ANS) was used to characterize possible conformational changes in mutant toxin B drug substance and triple mutant toxin B upon changes in pH. As can be seen from the results, there is essentially no increase in ANS fluorescence intensity when either mutant toxin B drug substance or triple mutant toxin B are titrated with the probe at pH 7.0, suggesting that no hydrophobic surfaces are exposed on the proteins under these conditions. Shifting pH to 2.6 leads to a dramatic increase in ANS fluorescence quantum yield upon increase in probe's concentration in the presence of mutant toxin B drug substance, until fluorescence quantum yield reaches apparent saturation. This increase in ANS fluorescence quantum yield indicates that at low pH (2.6), mutant toxin B drug substance undergoes pH-induced conformational change that exposes hydrophobic surfaces. Such conformational changes indicate that EDC-induced modification and inactivation of triple mutant toxin B did not restrict conformational plasticity of mutant toxin B drug substance (DS).

Effect of EDC treatment on hydrodynamic properties of triple mutant toxin B was evaluated using size-exclusion chromatography on a G4000 SWXL column. mutant toxin B drug substance and triple mutant toxin B were injected onto the G4000 SWXL column equilibrated at pH 7.0, 6.0, 5.0. The data indicate that no differences in the Stoke's radius of mutant toxin B drug substance and triple mutant toxin B can be detected using size-exclusion chromatography, therefore EDC treatment has not dramatically affected hydrodynamic properties and, correspondingly, overall molecular shape of the protein.

Further analysis of triple mutant toxin B and mutant toxin B drug substance was performed using multi-angle laser light scattering (MALLS) technique. Treatment of triple mutant toxin B with EDC resulted in generation of more heterogeneous mixture that is composed of various multimeric and monomeric species. Such heterogeneity reflects introduction of a large number of EDC-induced inter- and intra-molecular covalent bonds between carboxyls and primary amines of the protein.

Obtained data provide physical and chemical characteristics of triple mutant toxin B and mutant toxin B drug substance (triple mutant toxin B treated with EDC) and describe the key features of their primary, secondary, and tertiary structure. Generated data demonstrate that treatment of triple mutant toxin B with EDC resulted in covalent modification of its polypeptide chain but did not affect secondary and tertiary structures of the protein. Treatment with EDC leads to intra- and intermolecular cross-linking. The major biochemical and biophysical parameters obtained for mutant toxin B drug substance (as well as triple mutant toxin B) are presented in Table 61.

Table 61: Major Biochemical and Biophysical Parameters Obtained for Triple Mutant Toxin B (SEQ ID NO: 6) and Mutant Toxin B Drug Substance		
Parameter	**Triple mutant toxin B (SEQ ID NO: 6)**	**Mutant Toxin B Drug Substance**
Number of amino acid residues	2365	2365
N-terminal sequence	SLVNRKQLEKMANVR (positions 2-16 of SEQ ID NO: 6)	SLVNRKQLEKMANVR (positions 2-16 of SEQ ID NO: 6)
Mol mass (from AA sequence)	269.5 kDa	269.5 kDa
Mol mass (from SEC-MALLS)	255 kDa and ~1,754 kDa	264, 268, 706, and 2,211 kDa
Extinction coefficient at 280 nm	1.067 $(mg/ml)^{-1}cm^{-1}$	1.067 $(mg/ml)^{-1}cm^{-1}$
Theoretical pI	4.29	ND
Partial specific mol volume at 20 °C	0.734 cm^3/g	0.734 cm^3/g
Anhydrous volume/monomer	$3.3x10^{-19}cm^3$	$3.3x10^{-19}cm^3$
Sedimentation coefficient/monomer	9.1±0.2S	9.4S
Frictional coefficient ratio (f/f_0)	1.58±0.03	1.53
Stokes radius /monomer	76.2	76.2
Fluorescence max (λex = 280 nm)	335 nm	335 nm
Near-UV CD negative bands	290, 283, 276, 268, 262 nm	290, 283, 276, 268, 262 nm
Far-UV CD negative bands	208 and 222 nm	208 and 222 nm
DSC unfolding transition midpoints T_{m1} and T_{m2} (PBS, pH 7.0)	48.8±0.0 °C and 52.0±0.1 °C	48.2±0.3 °C and 54.3±0.2 °C

Example 46: Perfusion Fermentation for Toxoid B (triple mutant)

Toxoid B (triple mutant) seed cultures: inoculated each 1L bottle containing 400 mL of medium with 1 ml seed, incubate at 37°C, stationary overnight (~15 hrs). The final OD_{600} should be 3.0 – 4.0. Working vol: 3L (2.7L medium + 300 mL inoculum). Each fermenter had 1 Rushton impeller and a tube sparger. Initial conditions: Temperature: 37 °C, N2 flow: ~0.5 vvm, sparged. Controllers: pH controlled at 7.0 with 5N NaOH. Foam controlled by automatic addition of PPG-2000, with 0.25 mL/L added to the fermenter medium before sterilization.

Perfusion culture of *C. difficile* was performed using a stack of 2 SARTOCON Slice Cassettes, 0.2 µm pore size of HYDROSART filter material, 0.1 square meter surface area per cassette. The 3L was added to the fermentors in the 10 L glass fermentors. The perfusion started when the OD reaches the target ~4 for 2 hour intervals of increasing speed as 0.75 L/hr, 1.5 L/hr, 2.25 L/hr, 3 L/hr for example 1, Figure 28. The perfusion will be started with fermentation medium when the OD reaches the target ~4 for 2 hour intervals of increasing speed as 0.75 L/hr, 1.5 L/hr, 3 L/hr, and 6 L/hr for example 2, Figure 29. At the start signal for perfusion, the recirculation pump was started up at the desired speed at 1.3 L/min crossflow.

Example 1, Figure 28: Final OD 50 and toxoid B titer 243 mg/L were obtained.

Example 2, Figure 29: Final OD 59 and and toxoid B titer 306 mg/L were obtained.

The invention also provides the following embodiments as defined in the clauses below:Clause 1. An isolated polypeptide comprising SEQ ID NO: 183.

Clause 2. An isolated polypeptide comprising SEQ ID NO: 184.

Clause 3. An immunogenic composition comprising an isolated polypeptide comprising SEQ ID NO: 183.

Clause 4. An immunogenic composition comprising an isolated polypeptide comprising SEQ ID NO: 184.

Clause 5. A culture medium comprising soy hydrolysate, yeast extract, and glucose, and wherein the medium comprises a *Clostridium difficile* bacterium derived from VPI 11186, wherein the bacterium lacks an endogenous polynucleotide encoding a toxin, wherein the bacterium comprises a polynucleotide encoding a mutant *C. difficile* toxin, wherein the bacterium further comprises a *Clostridium sporogenes* feredoxin (*fdx*) promoter.

Clause 6. A method of culturing *Clostridium difficile* comprising culturing *C. difficile* in a medium, wherein the medium comprises soy hydrolysate, yeast extract, and glucose, and wherein the medium comprises a *Clostridium difficile* bacterium derived from VPI 11186, wherein the bacterium lacks an endogenous polynucleotide encoding a toxin, wherein the bacterium comprises a polynucleotide encoding a mutant *C. difficile* toxin, wherein the bacterium further comprises a *Clostridium sporogenes* feredoxin (*fdx*) promoter.

Clause 7. A method of producing a *Clostridium difficile* toxin comprising culturing *C. difficile* in a medium under suitable conditions to produce a toxin, and isolating the toxin from the medium; wherein the medium comprises soy hydrolysate, yeast extract, and glucose, and wherein the medium comprises a *Clostridium difficile* bacteriumderived from VPI 11186, wherein the bacterium lacks an endogenous polynucleotide encoding a toxin, wherein the bacterium comprises a polynucleotide encoding a mutant *C. difficile* toxin, wherein the bacterium further comprises a *Clostridium sporogenes* feredoxin (*fdx*) promoter.

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The claims defining the invention are as follows:

1. A culture medium comprising soy hydrolysate, yeast extract, and glucose, wherein the medium comprises a *Clostridium difficile* bacterium which comprises the amino acid sequence set forth in any one of SEQ ID NOs: 178-761.
2. The medium according to claim 1, further comprising polyethylene glycol 2000.
3. The medium according to claim 1, further comprising thiamphenicol.
4. The medium according to claim 1, wherein the bacterium is derived from *C. difficile* VPI 11186.
5. The medium according to claim 1, wherein the bacterium comprises a polynucleotide encoding a mutant *C. difficile* toxin, wherein the bacterium further comprises a *Clostridium sporogenes* feredoxin (*fdx*) promoter.
6. The medium according to claim 1, wherein the bacterium is a recombinant *C. difficile* VPI 11186 (ATCC 700057).
7. The medium according to claim 1, wherein the bacterium is a recombinant *C. difficile* 1351 (ATCC 43593).
8. The medium according to claim 1, wherein the bacterium is a recombinant *C. difficile* 3232 (ATCC BAA-1801).
9. The medium according to claim 1, wherein the bacterium is a recombinant *C. difficile* 7322 (ATCC 43601).
10. The medium according to claim 1, wherein the bacterium is a recombinant *C. difficile* 5036 (ATCC 43603).
11. The medium according to claim 1, wherein the bacterium is a recombinant *C. difficile* 4811 (ATCC 43602).
12. A method of culturing *Clostridium difficile* comprising culturing *C. difficile* in a medium, wherein the medium comprises soy hydrolysate, yeast extract, and glucose, and wherein the medium comprises a *Clostridium difficile* bacterium derived from VPI 11186, wherein the bacterium lacks an endogenous polynucleotide encoding a toxin, wherein the bacterium comprises a polynucleotide encoding a mutant *C. difficile* toxin, wherein the bacterium further comprises a Clostridium sporogenes feredoxin (fdx) promoter.
13. A method of producing a *Clostridium difficile* toxin comprising culturing *C. difficile* in a medium under suitable conditions to produce a toxin, and isolating the toxin from

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the medium; wherein the medium comprises soy hydrolysate, yeast extract, and glucose, and wherein the medium comprises a *Clostridium difficile* bacterium derived from VPI 11186, wherein the bacterium lacks an endogenous polynucleotide encoding a toxin, wherein the bacterium comprises a polynucleotide encoding the mutant *C. difficile* toxin, wherein the bacterium further comprises a Clostridium sporogenes feredoxin (fdx) promoter.

14. A method of producing a mutant *Clostridium difficile* toxin comprising culturing *C. difficile* in a medium under suitable conditions to produce the toxin, and isolating the toxin from the medium; wherein the medium comprises soy hydrolysate and glucose, wherein the medium comprises a *Clostridium difficile* bacterium.
15. The method according to claim 14, wherein the medium further comprises yeast extract.
16. The method according to claim 15, wherein the yeast extract comprises HY-YEST.
17. The method according to any one of claims 12, 13 or 14, wherein the medium further comprises polyethylene glycol 2000.
18. The method according to any one of claims 12, 13 or 14, wherein the medium further comprises thiamphenicol.
19. The method according to any one of claims 12, 13 or 14, wherein the bacterium comprises a polynucleotide encoding a mutant *C. difficile* toxin, wherein the bacterium further comprises a *Clostridium sporogenes* feredoxin (*fdx*) promoter.
20. The method according to any one of claims 12, 13 or 14, wherein the bacterium comprises a nucleic acid sequence that encodes an isolated polypeptide, which comprises the amino acid sequence set forth in any of SEQ ID NOs: 183-761.
21. The method according to any one of claims 12, 13 or 14, wherein the bacterium is a recombinant *C. difficile* VPI 11186 (ATCC 700057).
22. The method according to any one of claims 12, 13 or 14, wherein the bacterium is a recombinant *C. difficile* 1351 (ATCC 43593).
23. The method according to any one of claims 12, 13 or 14, wherein the bacterium is a recombinant *C. difficile* 3232 (ATCC BAA-1801).
24. The method according to any one of claims 12, 13 or 14, wherein the bacterium is a recombinant *C. difficile* 7322 (ATCC 43601).
25. The method according to any one of claims 12, 13 or 14, wherein the bacterium is a recombinant *C. difficile* 5036 (ATCC 43603).

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26. The method according to any one of claims 12, 13 or 14, wherein the bacterium is a recombinant *C. difficile* 4811 (ATCC 43602).

FIG. 1A

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MSLISKEELIKLAYSIRPRENEYKTILTNLDEYNKLTTNNNENKYLQLKK 50
MSLISKEELIKLAYSIRPRENEYKTILTNLDEYNKLTTNNNENKYLQLKK 50
MSLISKEELIKLAYSIRPRENEYKTILTNLDEYNKLTTNNNENKYLQLKK 50
MSLISKEELIKLAYSIRPRENEYKTILTNLDEYNKLTTNNNENKYLQLKK 50
MSLISKEELIKLAYSIRPRENEYKTILTNLDEYNKLTTNNNENKYLQLKK 50
**************************************************

LNESIDVFMNKYKTSSRNRALSNLKKDILKEVILIKNSNTSPVEKNLHFV 100
LNESIDVFMNKYKTSSRNRALSNLKKDILKEVILIKNSNTSPVEKNLHFV 100
LNESIDVFMNKYKTSSRNRALSNLKKDILKEVILIKNSNTSPVEKNLHFV 100
LNESIDVFMNKYKNSSRNRALSNLKKDILKEVILIKNSNTSPVEKNLHFV 100
LNESIDVFMNKYKNSSRNRALSNLKKDILKEVILIKNSNTSPVEKNLHFV 100
**********.***********************************

WIGGEVSDIALEYIKQWADINAEYNIKLWYDSEAFLVNTLKKAIVESSTT 150
WIGGEVSDIALEYIKQWADINAEYNIKLWYDSEAFLVNTLKKAIVESSTT 150
WIGGEVSDIALEYIKQWADINAEYNIKLWYDSEAFLVNTLKKAIVESSTT 150
WIGGEVSDIALEYIKQWADINAEYNIKLWYDSEAFLVNTLKKAIVESSTT 150
WIGGEVSDIALEYIKQWADINAEYNIKLWYDSEAFLVNTLKKAIVESSTT 150
**************************************************

EALQLLEEEIQNPQFDNMKFYKKRMEFIYDRQKRFINYYKSQINKPTVPT 200
EALQLLEEEIQNPQFDNMKFYKKRMEFIYDRQKRFINYYKSQINKPTVPT 200
EALQLLEEEIQNPQFDNMKFYKKRMEFIYDRQKRFINYYKSQINKPTVPT 200
EALQLLEEEIQNPQFDNMKFYKKRMEFIYDRQKRFINYYKSQINKPTVPT 200
EALQLLEEEIQNPQFDNMKFYKKRMEFIYDRQKRFINYYKSQINKPTVPT 200
**************************************************

IDDIIKSHLVSEYNRDETVLESYRTNSLRKINSNHGIDIRANSLFTEQEL 250
IDDIIKSHLVSEYNRDETVLESYRTNSLRKINSNHGIDIRANSLFTEQEL 250
IDDIIKSHLVSEYNRDETVLESYRTNSLRKINSNHGIDIRANSLFTEQEL 250
IDDIIKSHLVSEYNRDETLLESYRTNSLRKINSNHGIDIRANSLFTEQEL 250
IDDIIKSHLVSEYNRDETLLESYRTNSLRKINSNHGIDIRANSLFTEQEL 250
******************:*********************************

LNIYSQELLNRGNLAAASDIVRLLALKNFGGVYLDVDMLPGIHSDLFKTI 300
LNIYSQELLNRGNLAAASDIVRLLALKNFGGVYLAVAMLPGIHSDLFKTI 300
LNIYSQELLNRGNLAAASDIVRLLALKNFGGVYLDVDMLPGIHSDLFKTI 300
LNIYSQELLNRGNLAAASDIVRLLALKNFGGVYLDVDMLPGIHSDLFKTI 300
LNIYSQELLNRGNLAAASDIVRLLALKNFGGVYLDVDMLPGIHSDLFKTI 300
********************************** * *************

SRPSSIGLDRWEMIKLEAIMKYKKYINNYTSENFDKLDQQLKDNFKLIIE 350
SRPSSIGLDRWEMIKLEAIMKYKKYINNYTSENFDKLDQQLKDNFKLIIE 350
SRPSSIGLDRWEMIKLEAIMKYKKYINNYTSENFDKLDQQLKDNFKLIIE 350
PRPSSIGLDRWEMIKLEAIMKYKKYINNYTSENFDKLDQQLKDNFKLIIE 350
PRPSSIGLDRWEMIKLEAIMKYKKYINNYTSENFDKLDQQLKDNFKLIIE 350
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FIG. 1B

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SKSEKSEIFSKLENLNVSDLEIKIAFALGSVINQALISKQGSYLTNLVIE 400
SKSEKSEIFSKLENLNVSDLEIKIAFALGSVINQALISKQGSYLTNLVIE 400
SKSEKSEIFSKLENLNVSDLEIKIAFALGSVINQALISKQGSYLTNLVIE 400
SKSEKSEIFSKLENLNVSDLEIKIAFALGSVINQALISKQGSYLTNLVIE 400
SKSEKSEIFSKLENLNVSDLEIKIAFALGSVINQALISKQGSYLTNLVIE 400
**************************************************

QVKNRYQFLNQHLNPAIESDNNFTDTTKIFHDSLFNSATAENSMFLTKIA 450
QVKNRYQFLNQHLNPAIESDNNFTDTTKIFHDSLFNSATAENSMFLTKIA 450
QVKNRYQFLNQHLNPAIESDNNFTDTTKIFHDSLFNSATAENSMFLTKIA 450
QVKNRYQFLNQHLNPAIESDNNFTDTTKIFHDSLFNSATAENSMFLTKIA 450
QVKNRYQFLNQHLNPAIESDNNFTDTTKIFHDSLFNSATAENSMFLTKIA 450
**************************************************

PYLQVGFMPEARSTISLSGPGAYASAYYDFINLQENTIEKTLKASDLIEF 500
PYLQVGFMPEARSTISLSGPGAYASAYYDFINLQENTIEKTLKASDLIEF 500
PYLQVGFMPEARSTISLSGPGAYASAYYDFINLQENTIEKTLKASDLIEF 500
PYLQVGFMPEARSTISLSGPGAYASAYYDFINLQENTIEKTLKASDLIEF 500
PYLQVGFMPEARSTISLSGPGAYASAYYDFINLQENTIEKTLKASDLIEF 500
**************************************************

KFPENNLSQLTEQEINSLWSFDQASAKYQFEKYVRDYTGGSLSEDNGVDF 550
KFPENNLSQLTEQEINSLWSFDQASAKYQFEKYVRDYTGGSLSEDNGVDF 550
KFPENNLSQLTEQEINSLWSFDQASAKYQFEKYVRDYTGGSLSEDNGVDF 550
KFPENNLSQLTEQEINSLWSFDQASAKYQFEKYVRDYTGGSLSEDNGVDF 550
KFPENNLSQLTEQEINSLWSFDQASAKYQFEKYVRDYTGGSLSEDNGVDF 550
**************************************************

NKNTALDKNYLLNNKIPSNNVEEAGSKNYVHYIIQLQGDDISYEATCNLF 600
NKNTALDKNYLLNNKIPSNNVEEAGSKNYVHYIIQLQGDDISYEATCNLF 600
NKNTALDKNYLLNNKIPSNNVEEAGSKNYVHYIIQLQGDDISYEATCNLF 600
NKNTALDKNYLLNNKIPSNNVEEAGSKNYVHYIIQLQGDDISYEATCNLF 600
NKNTALDKNYLLNNKIPSNNVEEAGSKNYVHYIIQLQGDDISYEATCNLF 600
**************************************************

SKNPKNSIIIQRNMNESAKSYFLSDDGESILELNKYRIPERLKNKEKVKV 650
SKNPKNSIIIQRNMNESAKSYFLSDDGESILELNKYRIPERLKNKEKVKV 650
SKNPKNSIIIQRNMNESAKSYFLSDDGESILELNKYRIPERLKNKEKVKV 650
SKNPKNSIIIQRNMNESAKSYFLSDDGESILELNKYRIPERLKNKEKVKV 650
SKNPKNSIIIQRNMNESAKSYFLSDDGESILELNKYRIPERLKNKEKVKV 650
**************************************************

TFIGHGKDEFNTSEFARLSVDSLSNEISSFLDTIKLDISPKNVEVNLLGC 700
TFIGHGKDEFNTSEFARLSVDSLSNEISSFLDTIKLDISPKNVEVNLLGA 700
TFIGHGKDEFNTSEFARLSVDSLSNEISSFLDTIKLDISPKNVEVNLLGC 700
TFIGHGKDEFNTSEFARLSVDSLSNEISSFLDTIKLDISPKNVEVNLLGC 700
TFIGHGKDEFNTSEFARLSVDSLSNEISSFLDTIKLDISPKNVEVNLLGC 700
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FIG. 1C

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NMFSYDFNVEETYPGKLLLSIMDKITSTLPDVNKNSITIGANQYEVRINS 750
NMFSYDFNVEETYPGKLLLSIMDKITSTLPDVNKNSITIGANQYEVRINS 750
NMFSYDFNVEETYPGKLLLSIMDKITSTLPDVNKNSITIGANQYEVRINS 750
NMFSYDFNVEETYPGKLLLSIMDKITSTLPDVNKDSITIGANQYEVRINS 750
NMFSYDFNVEETYPGKLLLSIMDKITSTLPDVNKDSITIGANQYEVRINS 750
************************************:***************

EGRKELLAHSGKWINKEEAIMSDLSSKEYIFFDSIDNKLKAKSKNIPGLA 800
EGRKELLAHSGKWINKEEAIMSDLSSKEYIFFDSIDNKLKAKSKNIPGLA 800
EGRKELLAHSGKWINKEEAIMSDLSSKEYIFFDSIDNKLKAKSKNIPGLA 800
EGRKELLAHSGKWINKEEAIMSDLSSKEYIFFDSIDNKLKAKSKNIPGLA 800
EGRKELLAHSGKWINKEEAIMSDLSSKEYIFFDSIDNKLKAKSKNIPGLA 800
************************************************

SISEDIKTLLLDASVSPDTKFILNNLKLNIESSIGDYIYYEKLEPVKNII 850
SISEDIKTLLLDASVSPDTKFILNNLKLNIESSIGDYIYYEKLEPVKNII 850
SISEDIKTLLLDASVSPDTKFILNNLKLNIESSIGDYIYYEKLEPVKNII 850
SISEDIKTLLLDASVSPDTKFILNNLKLNIESSIGDYIYYEKLEPVKNII 850
SISEDIKTLLLDASVSPDTKFILNNLKLNIESSIGDYIYYEKLEPVKNII 850
************************************************

HNSIDDLIDEFNLLENVSDELYELKKLNNLDEKYLISFEDISKNNSTYSV 900
HNSIDDLIDEFNLLENVSDELYELKKLNNLDEKYLISFEDISKNNSTYSV 900
HNSIDDLIDEFNLLENVSDELYELKKLNNLDEKYLISFEDISKNNSTYSV 900
HNSIDDLIDEFNLLENVSDELYELKKLNNLDEKYLISFEDISKNNSTYSV 900
HNSIDDLIDEFNLLENVSDELYELKKLNNLDEKYLISFEDISKNNSTYSV 900
************************************************

RFINKSNGESVYVETEKEIFSKYSEHITKEISTIKNSIITDVNGNLLDNI 950
RFINKSNGESVYVETEKEIFSKYSEHITKEISTIKNSIITDVNGNLLDNI 950
RFINKSNGESVYVETEKEIFSKYSEHITKEISTIKNSIITDVNGNLLDNI 950
RFINKSNGESVYVETEKEIFSKYSEHITKEISTIKNSIITDVNGNLLDNI 950
RFINKSNGESVYVETEKEIFSKYSEHITKEISTIKNSIITDVNGNLLDNI 950
************************************************

QLDHTSQVNTLNAAFFIQSLIDYSSNKDVLNDLSTSVKVQLYAQLFSTGL 1000
QLDHTSQVNTLNAAFFIQSLIDYSSNKDVLNDLSTSVKVQLYAQLFSTGL 1000
QLDHTSQVNTLNAAFFIQSLIDYSSNKDVLNDLSTSVKVQLYAQLFSTGL 1000
QLDHTSQVNTLNAAFFIQSLIDYSSNKDVLNDLSTSVKVQLYAQLFSTGL 1000
QLDHTSQVNTLNAAFFIQSLIDYSSNKDVLNDLSTSVKVQLYAQLFSTGL 1000
************************************************

NTIYDSIQLVNLISNAVNDTINVLPTITEGIPIVSTILDGINLGAAIKEL 1050
NTIYDSIQLVNLISNAVNDTINVLPTITEGIPIVSTILDGINLGAAIKEL 1050
NTIYDSIQLVNLISNAVNDTINVLPTITEGIPIVSTILDGINLGAAIKEL 1050
NTIYDSIQLVNLISNAVNDTINVLPTITEGIPIVSTILDGINLGAAIKEL 1050
NTIYDSIQLVNLISNAVNDTINVLPTITEGIPIVSTILDGINLGAAIKEL 1050
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FIG. 1D

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LDEHDPLLKKELEAKVGVLAINMSLSIAATVASIVGIGAEVTIFLLPIAG 1100
LDEHDPLLKKELEAKVGVLAINMSLSIAATVASIVGIGAEVTIFLLPIAG 1100
LDEHDPLLKKELEAKVGVLAINMSLSIAATVASIVGIGAEVTIFLLPIAG 1100
LDEHDPLLKKELEAKVGVLAINMSLSIAATVASIVGIGAEVTIFLLPIAG 1100
LDEHDPLLKKELEAKVGVLAINMSLSIAATVASIVGIGAEVTIFLLPIAG 1100
************************************************

ISAGIPSLVNNELILHDKATSVVNYFNHLSESKKYGPLKTEDDKILVPID 1150
ISAGIPSLVNNELILHDKATSVVNYFNHLSESKKYGPLKTEDDKILVPID 1150
ISAGIPSLVNNELILHDKATSVVNYFNHLSESKKYGPLKTEDDKILVPID 1150
ISAGIPSLVNNELILHDKATSVVNYFNHLSESKEYGPLKTEDDKILVPID 1150
ISAGIPSLVNNELILHDKATSVVNYFNHLSESKEYGPLKTEDDKILVPID 1150
***********************************:****************

DLVISEIDFNNNSIKLGTCNILAMEGGSGHTVTGNIDHFFSSPSISSHIP 1200
DLVISEIDFNNNSIKLGTCNILAMEGGSGHTVTGNIDHFFSSPSISSHIP 1200
DLVISEIDFNNNSIKLGTCNILAMEGGSGHTVTGNIDHFFSSPSISSHIP 1200
DLVISEIDFNNNSIKLGTCNILAMEGGSGHTVTGNIDHFFSSPYISSHIP 1200
DLVISEIDFNNNSIKLGTCNILAMEGGSGHTVTGNIDHFFSSPYISSHIP 1200
****************************************** ******

SLSIYSAIGIETENLDFSKKIMMLPNAPSRVFWWETGAVPGLRSLENDGT 1250
SLSIYSAIGIETENLDFSKKIMMLPNAPSRVFWWETGAVPGLRSLENDGT 1250
SLSIYSAIGIETENLDFSKKIMMLPNAPSRVFWWETGAVPGLRSLENDGT 1250
SLSVYSAIGIKTENLDFSKKIMMLPNAPSRVFWWETGAVPGLRSLENNGT 1250
SLSVYSAIGIKTENLDFSKKIMMLPNAPSRVFWWETGAVPGLRSLENNGT 1250
***:******:************************************:**

RLLDSIRDLYPGKFYWRFYAFFDYAITTLKPVYEDTNIKIKLDKDTRNFI 1300
RLLDSIRDLYPGKFYWRFYAFFDYAITTLKPVYEDTNIKIKLDKDTRNFI 1300
RLLDSIRDLYPGKFYWRFYAFFDYAITTLKPVYEDTNIKIKLDKDTRNFI 1300
KLLDSIRDLYPGKFYWRFYAFFDYAITTLKPVYEDTNTKIKLDKDTRNFI 1300
KLLDSIRDLYPGKFYWRFYAFFDYAITTLKPVYEDTNTKIKLDKDTRNFI 1300
:************************************ ************

MPTITTNEIRNKLSYSFDGAGGTYSLLLSSYPISTNINLSKDDLWIFNID 1350
MPTITTNEIRNKLSYSFDGAGGTYSLLLSSYPISTNINLSKDDLWIFNID 1350
MPTITTNEIRNKLSYSFDGAGGTYSLLLSSYPISTNINLSKDDLWIFNID 1350
MPTITTDEIRNKLSYSFDGAGGTYSLLLSSYPISMNINLSKDDLWIFNID 1350
MPTITTDEIRNKLSYSFDGAGGTYSLLLSSYPISMNINLSKDDLWIFNID 1350
******:***************************** ***************

NEVREISIENGTIKKGKLIKDVLSKIDINKNKLIIGNQTIDFSGDIDNKD 1400
NEVREISIENGTIKKGKLIKDVLSKIDINKNKLIIGNQTIDFSGDIDNKD 1400
NEVREISIENGTIKKGKLIKDVLSKIDINKNKLIIGNQTIDFSGDIDNKD 1400
NEVREISIENGTIKKGNLIEDVLSKIDINKNKLIIGNQTIDFSGDIDNKD 1400
NEVREISIENGTIKKGNLIEDVLSKIDINKNKLIIGNQTIDFSGDIDNKD 1400
****************:**:*******************************
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FIG. 1E

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RYIFLTCELDDKISLIIEINLVAKSYSLLLSGDKNYLISNLSNIIEKINT 1450
RYIFLTCELDDKISLIIEINLVAKSYSLLLSGDKNYLISNLSNIIEKINT 1450
RYIFLTCELDDKISLIIEINLVAKSYSLLLSGDKNYLISNLSNTIEKINT 1450
RYIFLTCELDDKISLIIEINLVAKSYSLLLSGDKNYLISNLSNTIEKINT 1450
RYIFLTCELDDKISLIIEINLVAKSYSLLLSGDKNYLISNLSNTIEKINT 1450
****************************************** ******

LGLDSKNIAYNYTDESNNKYFGAISKTSQKSIIHYKKDSKNILEFYNDST 1500
LGLDSKNIAYNYTDESNNKYFGAISKTSQKSIIHYKKDSKNILEFYNDST 1500
LGLDSKNIAYNYTDESNNKYFGAISKTSQKSIIHYKKDSKNILEFYNDST 1500
LGLDSKNIAYNYTDESNNKYFGAISKTSQKSIIHYKKDSKNILEFYNGST 1500
LGLDSKNIAYNYTDESNNKYFGAISKTSQKSIIHYKKDSKNILEFYNGST 1500
*************************************************.**

LEFNSKDFIAEDINVFMKDDINTITGKYYVDNNTDKSIDFSISLVSKNQV 1550
LEFNSKDFIAEDINVFMKDDINTITGKYYVDNNTDKSIDFSISLVSKNQV 1550
LEFNSKDFIAEDINVFMKDDINTITGKYYVDNNTDKSIDFSISLVSKNQV 1550
LEFNSKDFIAEDINVFMKDDINTITGKYYVDNNTDKSIDFSISLVSKNQV 1550
LEFNSKDFIAEDINVFMKDDINTITGKYYVDNNTDKSIDFSISLVSKNQV 1550
*************************************************

KVNGLYLNESVYSSYLDFVKNSDGHHNTSNFMNLFLDNISFWKLFGFENI 1600
KVNGLYLNESVYSSYLDFVKNSDGHHNTSNFMNLFLDNISFWKLFGFENI 1600
KVNGLYLNESVYSSYLDFVKNSDGHHNTSNFMNLFLDNISFWKLFGFENI 1600
KVNGLYLNESVYSSYLDFVKNSDGHHNTSNFMNLFLNNISFWKLFGFENI 1600
KVNGLYLNESVYSSYLDFVKNSDGHHNTSNFMNLFLNNISFWKLFGFENI 1600
************************************:************

NFVIDKYFTLVGKTNLGYVEFICDNNKNIDIYFGEWKTSSSKSTIFSGNG 1650
NFVIDKYFTLVGKTNLGYVEFICDNNKNIDIYFGEWKTSSSKSTIFSGNG 1650
NFVIDKYFTLVGKTNLGYVEFICDNNKNIDIYFGEWKTSSSKSTIFSGNG 1650
NFVIDKYFTLVGKTNLGYVEFICDNNKNIDIYFGEWKTSSSKSTIFSGNG 1650
NFVIDKYFTLVGKTNLGYVEFICDNNKNIDIYFGEWKTSSSKSTIFSGNG 1650
*************************************************

RNVVVEPIYNPDTGEDISTSLDFSYEPLYGIDRYINKVLIAPDLYTSLIN 1700
RNVVVEPIYNPDTGEDISTSLDFSYEPLYGIDRYINKVLIAPDLYTSLIN 1700
RNVVVEPIYNPDTGEDISTSLDFSYEPLYGIDRYINKVLIAPDLYTSLIN 1700
RNVVVEPIYNPDTGEDISTSLDFSYEPLYGIDRYINKVLIAPDLYTSLIN 1700
RNVVVEPIYNPDTGEDISTSLDFSYEPLYGIDRYINKVLIAPDLYTSLIN 1700
*************************************************

INTNYYSNEYYPEIIVLNPNTFHKKVNINLDSSSFEYKWSTEGSDFILVR 1750
INTNYYSNEYYPEIIVLNPNTFHKKVNINLDSSSFEYKWSTEGSDFILVR 1750
INTNYYSNEYYPEIIVLNPNTFHKKVNINLDSSSFEYKWSTEGSDFILVR 1750
INTNYYSNEYYPEIIVLNPNTFHKKVNINLDSSSFEYKWSTEGSDFILVR 1750
INTNYYSNEYYPEIIVLNPNTFHKKVNINLDSSSFEYKWSTEGSDFILVR 1750
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FIG. 1F

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YLEESNKKILQKIRIKGILSNTQSFNKMSIDFKDIKKLSLGYIMSNFKSF 1800
YLEESNKKILQKIRIKGILSNTQSFNKMSIDFKDIKKLSLGYIMSNFKSF 1800
YLEESNKKILQKIRIKGILSNTQSFNKMSIDFKDIKKLSLGYIMSNFKSF 1800
YLEESNKKILQKIRIKGILSNTQSFNKMSIDFKDIKKLSLGYIMSNFKSF 1800
YLEESNKKILQKIRIKGILSNTQSFNKMSIDFKDIKKLSLGYIMSNFKSF 1800
**************************************************

NSENELDRDHLGFKIIDNKTYYYDEDSKLVKGLININNSLFYFDPIEFNL 1850
NSENELDRDHLGFKIIDNKTYYYDEDSKLVKGLININNSLFYFDPIEFNL 1850
NSENELDRDHLGFKIIDNKTYYYDEDSKLVKGLININNSLFYFDPIEFNL 1850
NSENELDRDHLGFKIIDNKTYYYDEDSKLVKGLININNSLFYFDPIESNL 1850
NSENELDRDHLGFKIIDNKTYYYDEDSKLVKGLININNSLFYFDPIESNL 1850
************************************************** **

VTGWQTINGKKYYFDINTGAALISYKIINGKHFYFNNDGVMQLGVFKGPD 1900
VTGWQTINGKKYYFDINTGAALISYKIINGKHFYFNNDGVMQLGVFKGPD 1900
VTGWQTINGKKYYFDINTGAALTSYKIINGKHFYFNNDGVMQLGVFKGPD 1900
VTGWQTINGKKYYFDINTGAASTSYKIINGKHFYFNNNGVMQLGVFKGPD 1900
VTGWQTINGKKYYFDINTGAASTSYKIINGKHFYFNNNGVMQLGVFKGPD 1900
********************  **************:*************

GFEYFAPANTQNNNIEGQAIVYQSKFLTLNGKKYYFDNDSKAVTGWRIIN 1950
GFEYFAPANTQNNNIEGQAIVYQSKFLTLNGKKYYFDNDSKAVTGWRIIN 1950
GFEYFAPANTQNNNIEGQAIVYQSKFLTLNGKKYYFDNNSKAVTGWRIIN 1950
GFEYFAPANTQNNNIEGQAIVYQSKFLTLNGKKYYFDNDSKAVTGWRIIN 1950
GFEYFAPANTQNNNIEGQAIVYQSKFLTLNGKKYYFDNDSKAVTGWRIIN 1950
************************************:***********

NEKYYFNPNNAIAAVGLQVIDNNKYYFNPDTAIISKGWQTVNGSRYYFDT 2000
NEKYYFNPNNAIAAVGLQVIDNNKYYFNPDTAIISKGWQTVNGSRYYFDT 2000
NEKYYFNPNNAIAAVGLQVIDNNKYYFNPDTAIISKGWQTVNGSRYYFDT 2000
NEKYYFNPNNAIAAVGLQVIDNNKYYFNPDTAIISKGWQTVNGSRYYFDT 2000
NEKYYFNPNNAIAAVGLQVIDNNKYYFNPDTAIISKGWQTVNGSRYYFDT 2000
**************************************************

DTAIAFNGYKTIDGKHFYFDSDCVVKIGVFSTSNGFEYFAPANTYNNNIE 2050
DTAIAFNGYKTIDGKHFYFDSDCVVKIGVFSTSNGFEYFAPANTYNNNIE 2050
DTAIAFNGYKTIDGKHFYFDSDCVVKIGVFSTSNGFEYFAPANTYNNNIE 2050
DTAIAFNGYKTIDGKHFYFDSDCVVKIGVFSGSNGFEYFAPANTYNNNIE 2050
DTAIAFNGYKTIDGKHFYFDSDCVVKIGVFSGSNGFEYFAPANTYNNNIE 2050
******************************** ******************

GQAIVYQSKFLTLNGKKYYFDNNSKAVTGWQTIDSKKYYFNTNTAEAATG 2100
GQAIVYQSKFLTLNGKKYYFDNNSKAVTGWQTIDSKKYYFNTNTAEAATG 2100
GQAIVYQSKFLTLNGKKYYFDNNSKAVTGLQTIDSKKYYFNTNTAEAATG 2100
GQAIVYQSKFLTLNGKKYYFDNNSKAVTGWQTIDSKKYYFNTNTAEAATG 2100
GQAIVYQSKFLTLNGKKYYFDNNSKAVTGWQTIDSKKYYFNTNTAEAATG 2100
****************************** ******************
```

FIG. 1G

```
WQTIDGKKYYFNTNTAEAATGWQTIDGKKYYFNTNTAIASTGYTIINGKH 2150
WQTIDGKKYYFNTNTAEAATGWQTIDGKKYYFNTNTAIASTGYTIINGKH 2150
WQTIDGKKYYFNTNTAEAATGWQTIDGKKYYFNTNTAIASTGYTIINGKH 2150
WQTIDGKKYYFNTNTAEAATGWQTIDGKKYYFNTNTSIASTGYTIINGKY 2150
WQTIDGKKYYFNTNTAEAATGWQTIDGKKYYFNTNTSIASTGYTIINGKY 2150
************************************:************:

FYFNTDGIMQIGVFKGPNGFEYFAPANTDANNIEGQAILYQNEFLTLNGK 2200
FYFNTDGIMQIGVFKGPNGFEYFAPANTDANNIEGQAILYQNEFLTLNGK 2200
FYFNTDGIMQIGVFKGPNGFEYFAPANTDANNIEGQAILYQNEFLTLNGK 2200
FYFNTDGIMQIGVFKVPNGFEYFAPANTHNNNIEGQAILYQNKFLTLNGK 2200
FYFNTDGIMQIGVFKVPNGFEYFAPANTHNNNIEGQAILYQNKFLTLNGK 2200
*************** ************. ************:*******

KYYFGSDSKAVTGWRIINNKKYYFNPNNAIAAIHLCTINNDKYYFSYDGI 2250
KYYFGSDSKAVTGWRIINNKKYYFNPNNAIAAIHLCTINNDKYYFSYDGI 2250
KYYFGSDSKAVTGWRIINNKKYYFNPNNAIAAIHLCTINNDKYYFSYDGI 2250
KYYFGSDSKAITGWQTIDGKKYYFNPNNAIAATHLCTINNDKYYFSYDGI 2250
KYYFGSDSKAITGWQTIDGKKYYFNPNNAIAATHLCTINNDKYYFSYDGI 2250
**********:***: *:.************* *****************

LQNGYITIERNNFYFDANNESKMVTGVFKGPNGFEYFAPANTHNNNIEGQ 2300
LQNGYITIERNNFYFDANNESKMVTGVFKGPNGFEYFAPANTHNNNIEGQ 2300
LQNGYITIERNNFYFDANNESKMVTGVFKGPNGFEYFAPANTHNNNIEGQ 2300
LQNGYITIERNNFYFDANNESKMVTGVFKGPNGFEYFAPANTHNNNIEGQ 2300
LQNGYITIERNNFYFDANNESKMVTGVFKGPNGFEYFAPANTHNNNIEGQ 2300
**************************************************

AIVYQNKFLTLNGKKYYFDNDSKAVTGWQTIDGKKYYFNLNTAEAATGWQ 2350
AIVYQNKFLTLNGKKYYFDNDSKAVTGWQTIDGKKYYFNLNTAEAATGWQ 2350
AIVYQNKFLTLNGKKYYFDNDSKAVTGWQTIDGKKYYFNLNTAEAATGWQ 2350
AIVYQNKFLTLNGKKYYFDNDSKAVTGWQTIDSKKYYFNLNTAVAVTGWQ 2350
AIVYQNKFLTLNGKKYYFDNDSKAVTGWQTIDSKKYYFNLNTAVAVTGWQ 2350
**********************************.********** *.****

TIDGKKYYFNLNTAEAATGWQTIDGKKYYFNTNTFIASTGYTSINGKHFY 2400
TIDGKKYYFNLNTAEAATGWQTIDGKKYYFNTNTFIASTGYTSINGKHFY 2400
TIDGKKYYFNLNTAEAATGWQTIDGKKYYFNTNTFIASTGYTSINGKHFY 2400
TIDGEKYYFNLNTAEAATGWQTIDGKRYYFNTNTYIASTGYTIINGKHFY 2400
TIDGEKYYFNLNTAEAATGWQTIDGKRYYFNTNTYIASTGYTIINGKHFY 2400
****:**********************:*******:******* *******

FNTDGIMQIGVFKGPNGFEYFAPANTHNNNIEGQAILYQNKFLTLNGKKY 2450
FNTDGIMQIGVFKGPNGFEYFAPANTHNNNIEGQAILYQNKFLTLNGKKY 2450
FNTDGIMQIGVFKGPNGFEYFAPANTDANNIEGQAILYQNKFLTLNGKKY 2450
FNTDGIMQIGVFKGPDGFEYFAPANTHNNNIEGQAILYQNKFLTLNGKKY 2450
FNTDGIMQIGVFKGPDGFEYFAPANTHNNNIEGQAILYQNKFLTLNGKKY 2450
***************:**********. **********************
```

FIG. 1H

```
YFGSDSKAVTGLRTIDGKKYYFNTNTAVAVTGWQTINGKKYYFNTNTSIA 2500
YFGSDSKAVTGLRTIDGKKYYFNTNTAVAVTGWQTINGKKYYFNTNTSIA 2500
YFGSDSKAVTGLRTIDGKKYYFNTNTAVAVTGWQTINGKKYYFNTNTSIA 2500
YFGSDSKAVTGLRTIDGKKYYFNTNTAVAVTGWQTINGKKYYFNTNIYIA 2500
YFGSDSKAVTGLRTIDGKKYYFNTNTAVAVTGWQTINGKKYYFNTNTYIA 2500
********************************************** **

STGYTIISGKHFYFNTDGIMQIGVFKGPDGFEYFAPANTDANNIEGQAIR 2550
STGYTIISGKHFYFNTDGIMQIGVFKGPDGFEYFAPANTDANNIEGQAIR 2550
STGYTIISGKHFYFNTDGIMQIGVFKGPDGFEYFAPANTDANNIEGQAIR 2550
STGYTIISGKHFYFNTDGIMQIGVFKGPDGFEYFAPANTDANNIEGQAIR 2550
STGYTIISGKHFYFNTDGIMQIGVFKGPDGFEYFAPANTDANNIEGQAIR 2550
**************************************************

YQNRFLYLHDNIYYFGNNSKAATGWVTIDGNRYYFEPNTAMGANGYKTID 2600
YQNRFLYLHDNIYYFGNNSKAATGWVTIDGNRYYFEPNTAMGANGYKTID 2600
YQNRFLYLHDNIYYFGNNSKAATGWVTIDGNRYYFEPNTAMGANGYKTID 2600
YQNRFLYLHDNIYYFGNDSKAATGWATIDGNRYYFEPNTAMGANGYKTID 2600
YQNRFLYLHDNIYYFGNDSKAATGWATIDGNRYYFEPNTAMGANGYKTID 2600
******************:*******.************************

NKNFYFRNGLPQIGVFKGSNGFEYFAPANTDANNIEGQAIRYQNRFLHLL 2650
NKNFYFRNGLPQIGVFKGSNGFEYFAPANTDANNIEGQAIRYQNRFLHLL 2650
NKNFYFRNGLPQIGVFKGSNGFEYFAPANTDANNIEGQAIRYQNRFLHLL 2650
NKNFYFRNGLPQIGVFKGPNGFEYFAPANTDANNIDGQAIRYQNRFLHLL 2650
NKNFYFRNGLPQIGVFKGPNGFEYFAPANTDANNIDGQAIRYQNRFLHLL 2650
******************.***************:**************

GKIYYFGNNSKAVTGWQTINGKVYYFMPDTAMAAAGGLFEIDGVIYFFGV 2700
GKIYYFGNNSKAVTGWQTINGKVYYFMPDTAMAAAGGLFEIDGVIYFFGV 2700
GKIYYFGNNSKAVTGWQTINGKVYYFMPDTAMAAAGGLFEIDGVIYFFGV 2700
GKIYYFGNNSKAVTGWQTINSKVYYFMPDTAMAAAGGLFEIDGVIYFFGV 2700
GKIYYFGNNSKAVTGWQTINSKVYYFMPDTAMAAAGGLFEIDGVIYFFGV 2700
********************.******************************

DGVKAPGIYG 2710 (SEQ ID NO: 1, 630)
DGVKAPGIYG 2710 (SEQ ID NO: 4)
DGVKAPGIYG 2710 (SEQ ID NO: 19, VPI10463)
DGVKAPGIYG 2710 (SEQ ID NO: 15, R20291)
DGVKAPGIYG 2710 (SEQ ID NO: 17, CD196)
**********
```

Fig. 2A

```
MSLVNRKQLEKMANVRFRTQEDEYVAILDALEEYHNMSENTVVEKYLKLKDINSLTDIYI 60
MSLVNRKQLEKMANVRFRTQEDEYVAILDALEEYHNMSENTVVEKYLKLKDINSLTDIYI 60
MSLVNRKQLEKMANVRFRTQEDEYVAILDALEEYHNMSENTVVEKYLKLKDINSLTDIYI 60
MSLVNRKQLEKMANVRFRVQEDEYVAILDALEEYHNMSENTVVEKYLKLKDINSLTDIYI 60
MSLVNRKQLEKMANVRFRVQEDEYVAILDALEEYHNMSENTVVEKYLKLKDINSLTDIYI 60
******************.****************************************

DTYKKSGRNKALKKFKEYLVTEVLELKNNNLTPVEKNLHFVWIGGQINDTAINYINQWKD 120
DTYKKSGRNKALKKFKEYLVTEVLELKNNNLTPVEKNLHFVWIGGQINDTAINYINQWKD 120
DTYKKSGRNKALKKFKEYLVTEVLELKNNNLTPVEKNLHFVWIGGQINDTAINYINQWKD 120
DTYKKSGRNKALKKFKEYLVTEVLELKNNNLTPVEKNLHFVWIGGQINDTAINYINQWKD 120
DTYKKSGRNKALKKFKEYLVTEVLELKNNNLTPVEKNLHFVWIGGQINDTAINYINQWKD 120
************************************************************

VNSDYNVNVFYDSNAFLINTLKKTVVESAINDTLESFRENLNDPRFDYNKFFRKRMEIIY 180
VNSDYNVNVFYDSNAFLINTLKKTVVESAINDTLESFRENLNDPRFDYNKFFRKRMEIIY 180
VNSDYNVNVFYDSNAFLINTLKKTVVESAINDTLESFRENLNDPRFDYNKFFRKRMEIIY 180
VNSDYNVNVFYDSNAFLINTLKKTIVESATNDTLESFRENLNDPRFDYNKFYRKRMEIIY 180
VNSDYNVNVFYDSNAFLINTLKKTIVESATNDTLESFRENLNDPRFDYNKFYRKRMEIIY 180
*************************:**** **********************:********

DKQKNFINYYKAQREENPELIIDDIVKTYLSNEYSKEIDELNTYIEESLNKITQNSGNDV 240
DKQKNFINYYKAQREENPELIIDDIVKTYLSNEYSKEIDELNTYIEESLNKITQNSGNDV 240
DKQKNFINYYKAQREENPELIIDDIVKTYLSNEYSKEIDELNTYIEESLNKITQNSGNDV 240
DKQKNFINYYKTQREENPDLIIDDIVKIYLSNEYSKDIDELNSYIEESLNKVTENSGNDV 240
DKQKNFINYYKTQREENPDLIIDDIVKIYLSNEYSKDIDELNSYIEESLNKVTENSGNDV 240
***********:******:******** ********:*****:*********:*:*******

RNFEEFKNGESFNLYEQELVERWNLAAASDILRISALKEIGGMYLDVDMLPGIQPDLFES 300
RNFEEFKNGESFNLYEQELVERWNLAAASDILRISALKEIGGMYLDVDMLPGIQPDLFES 300
RNFEEFKNGESFNLYEQELVERWNLAAASDILRISALKEIGGMYLAVAMLPGIQPDLFES 300
RNFEEFKGGESFKLYEQELVERWNLAAASDILRISALKEVGGVYLDVDMLPGIQPDLFES 300
RNFEEFKGGESFKLYEQELVERWNLAAASDILRISALKEVGGVYLDVDMLPGIQPDLFES 300
*******.****:****************************:**:** * ************

IEKPSSVTVDFWEMTKLEAIMKYKEYIPEYTSEHFDMLDEEVQSSFESVLASKSDKSEIF 360
IEKPSSVTVDFWEMTKLEAIMKYKEYIPEYTSEHFDMLDEEVQSSFESVLASKSDKSEIF 360
IEKPSSVTVDFWEMTKLEAIMKYKEYIPEYTSEHFDMLDEEVQSSFESVLASKSDKSEIF 360
IEKPSSVTVDFWEMVKLEAIMKYKEYIPGYTSEHFDMLDEEVQSSFESVLASKSDKSEIF 360
IEKPSSVTVDFWEMVKLEAIMKYKEYIPGYTSEHFDMLDEEVQSSFESVLASKSDKSEIF 360
**************.************* ********************************

SSLGDMEASPLEVKIAFNSKGIINQGLISVKDSYCSNLIVKQIENRYKILNNSLNPAISE 420
SSLGDMEASPLEVKIAFNSKGIINQGLISVKDSYCSNLIVKQIENRYKILNNSLNPAISE 420
SSLGDMEASPLEVKIAFNSKGIINQGLISVKDSYCSNLIVKQIENRYKILNNSLNPAISE 420
SSLGDMEASPLEVKIAFNSKGIINQGLISVKDSYCSNLIVKQIENRYKILNNSLNPAISE 420
SSLGDMEASPLEVKIAFNSKGIINQGLISVKDSYCSNLIVKQIENRYKILNNSLNPAISE 420
************************************************************

DNDFNTTTNTFIDSIMAEANADNGRFMMELGKYLRVGFFPDVKTTINLSGPEAYAAAYQD 480
DNDFNTTTNTFIDSIMAEANADNGRFMMELGKYLRVGFFPDVKTTINLSGPEAYAAAYQD 480
DNDFNTTTNTFIDSIMAEANADNGRFMMELGKYLRVGFFPDVKTTINLSGPEAYAAAYQD 480
```

FIG. 2B

```
DNDFNTTTNAFIDSIMAEANADNGRFMMELGKYLRVGFFPDVKTTINLSGPEAYAAAYQD 480
DNDFNTTTNAFIDSIMAEANADNGRFMMELGKYLRVGFFPDVKTTINLSGPEAYAAAYQD 480
*********:**************************************************

LLMFKEGSMNIHLIEADLRNFEISKTNISQSTEQEMASLWSFDDARAKAQFEEYKRNYFE 540
LLMFKEGSMNIHLIEADLRNFEISKTNISQSTEQEMASLWSFDDARAKAQFEEYKRNYFE 540
LLMFKEGSMNIHLIEADLRNFEISKTNISQSTEQEMASLWSFDDARAKAQFEEYKRNYFE 540
LLMFKEGSMNIHLIEADLRNFEISKTNISQSTEQEMASLWSFDDARAKAQFEEYKKNYFE 540
LLMFKEGSMNIHLIEADLRNFEISKTNISQSTEQEMASLWSFDDARAKAQFEEYKKNYFE 540
*********************************************************:****

GSLGEDDNLDFSQNIVVDKEYLLEKISSLARSSERGYIHYIVQLQGDKISYEAACNLFAK 600
GSLGEDDNLDFSQNIVVDKEYLLEKISSLARSSERGYIHYIVQLQGDKISYEAACNLFAK 600
GSLGEDDNLDFSQNIVVDKEYLLEKISSLARSSERGYIHYIVQLQGDKISYEAACNLFAK 600
GSLGEDDNLDFSQNTVVDKEYLLEKISSLARSSERGYIHYIVQLQGDKISYEAACNLFAK 600
GSLGEDDNLDFSQNTVVDKEYLLEKISSLARSSERGYIHYIVQLQGDKISYEAACNLFAK 600
*************** ***********************************************

TPYDSVLFQKNIEDSEIAYYYNPGDGEIQEIDKYKIPSIISDRPKIKLTFIGHGKDEFNT 660
TPYDSVLFQKNIEDSEIAYYYNPGDGEIQEIDKYKIPSIISDRPKIKLTFIGHGKDEFNT 660
TPYDSVLFQKNIEDSEIAYYYNPGDGEIQEIDKYKIPSIISDRPKIKLTFIGHGKDEFNT 660
TPYDSVLFQKNIEDSEIAYYYNPGDGEIQEIDKYKIPSIISDRPKIKLTFIGHGKDEFNT 660
TPYDSVLFQKNIEDSEIAYYYNPGDGEIQEIDKYKIPSIISDRPKIKLTFIGHGKDEFNT 660
************************************************************

DIFAGFDVDSLSTEIEAAIDLAKEDISPKSIEINLLGCNMFSYSINVEETYPGKLLLKVK 720
DIFAGFDVDSLSTEIEAAIDLAKEDISPKSIEINLLGCNMFSYSINVEETYPGKLLLKVK 720
DIFAGFDVDSLSTEIEAAIDLAKEDISPKSIEINLLGANMFSYSINVEETYPGKLLLKVK 720
DIFAGLDVDSLSTEIETAIDLAKEDISPKSIEINLLGCNMFSYSVNVEETYPGKLLLRVK 720
DIFAGLDVDSLSTEIETAIDLAKEDISPKSIEINLLGCNMFSYSVNVEETYPGKLLLRVK 720
*****:**********:**********************.******:************:**

DKISELMPSISQDSIIVSANQYEVRINSEGRRELLDHSGEWINKEESIIKDISSKEYISF 780
DKISELMPSISQDSIIVSANQYEVRINSEGRRELLDHSGEWINKEESIIKDISSKEYISF 780
DKISELMPSISQDSIIVSANQYEVRINSEGRRELLDHSGEWINKEESIIKDISSKEYISF 780
DKVSELMPSISQDSIIVSANQYEVRINSEGRRELLDHSGEWINKEESIIKDISSKEYISF 780
DKVSELMPSISQDSIIVSANQYEVRINSEGRRELLDHSGEWINKEESIIKDISSKEYISF 780
**:**********************************************************

NPKENKITVKSKNLPELSTLLQEIRNNSNSSDIELEEKVMLTECEINVISNIDTQIVEER 840
NPKENKITVKSKNLPELSTLLQEIRNNSNSSDIELEEKVMLTECEINVISNIDTQIVEER 840
NPKENKITVKSKNLPELSTLLQEIRNNSNSSDIELEEKVMLTECEINVISNIDTQIVEER 840
NPKENKIIVKSKNLPELSTLLQEIRNNSNSSDIELEEKVMLAECEINVISNIDTQVVEGR 840
NPKENKIIVKSKNLPELSTLLQEIRNNSNSSDIELEEKVMLAECEINVISNIDTQVVEGR 840
******* ************************************:************:** *

IEEAKNLTSDSINYIKDEFKLIESISDALCDLKQQNELEDSHFISFEDISETDEGFSIRF 900
IEEAKNLTSDSINYIKDEFKLIESISDALCDLKQQNELEDSHFISFEDISETDEGFSIRF 900
IEEAKNLTSDSINYIKDEFKLIESISDALCDLKQQNELEDSHFISFEDISETDEGFSIRF 900
IEEAKSLTSDSINYIKNEFKLIESISDALYDLKQQNELEESHFISFEDILETDEGFSIRF 900
IEEAKSLTSDSINYIKNEFKLIESISDALYDLKQQNELEESHFISFEDILETDEGFSIRF 900
*****.**********:********** ********:********* **********
```

FIG. 2C

```
INKETGESIFVETEKTIFSEYANHITEEISKIKGTIFDTVNGKLVKKVNLDTTHEVNTLN 960
INKETGESIFVETEKTIFSEYANHITEEISKIKGTIFDTVNGKLVKKVNLDTTHEVNTLN 960
INKETGESIFVETEKTIFSEYANHITEEISKIKGTIFDTVNGKLVKKVNLDTTHEVNTLN 960
IDKETGESIFVETEKAIFSEYANHITEEISKIKGTIFDTVNGKLVKKVNLDATHEVNTLN 960
IDKETGESIFVETEKAIFSEYANHITEEISKIKGTIFDTVNGKLVKKVNLDATHEVNTLN 960
*:**************:*************************************:********

AAFFIQSLIEYNSSKESLSNLSVAMKVQVYAQLFSTGLNTITDAAKVVELVSTALDETID 1020
AAFFIQSLIEYNSSKESLSNLSVAMKVQVYAQLFSTGLNTITDAAKVVELVSTALDETID 1020
AAFFIQSLIEYNSSKESLSNLSVAMKVQVYAQLFSTGLNTITDAAKVVELVSTALDETID 1020
AAFFIQSLIEYNSSKESLSNLSVAMKVQVYAQLFSTGLNTITDAAKVVELVSTALDETID 1020
AAFFIQSLIEYNSSKESLSNLSVAMKVQVYAQLFSTGLNTITDAAKVVELVSTALDETID 1020
************************************************************

LLPTLSEGLPIIATIIDGVSLGAAIKELSETSDPLLRQEIEAKIGIMAVNLTTATTAIIT 1080
LLPTLSEGLPIIATIIDGVSLGAAIKELSETSDPLLRQEIEAKIGIMAVNLTTATTAIIT 1080
LLPTLSEGLPIIATIIDGVSLGAAIKELSETSDPLLRQEIEAKIGIMAVNLTTATTAIIT 1080
LLPTLSEGLPVIATIIDGVSLGAAIKELSETSDPLLRQEIEAKIGIMAVNLTAATTAIIT 1080
LLPTLSEGLPVIATIIDGVSLGAAIKELSETSDPLLRQEIEAKIGIMAVNLTAATTAIIT 1080
**********:*************************************:********

SSLGIASGFSILLVPLAGISAGIPSLVNNELVLRDKATKVVDYFKHVSLVETEGVFTLLD 1140
SSLGIASGFSILLVPLAGISAGIPSLVNNELVLRDKATKVVDYFKHVSLVETEGVFTLLD 1140
SSLGIASGFSILLVPLAGISAGIPSLVNNELVLRDKATKVVDYFKHVSLVETEGVFTLLD 1140
SSLGIASGFSILLVPLAGISAGIPSLVNNELILRDKATKVVDYFSHISLAESEGAFTSLD 1140
SSLGIASGFSILLVPLAGISAGIPSLVNNELILRDKATKVVDYFSHISLAESEGAFTSLD 1140
**********************************:***********.*:**.*:**.** **

DKIMMPQDDLVISEIDFNNNSIVLGKCEIWRMEGGSGHTVTDDIDHFFSAPSITYREPHL 1200
DKIMMPQDDLVISEIDFNNNSIVLGKCEIWRMEGGSGHTVTDDIDHFFSAPSITYREPHL 1200
DKIMMPQDDLVISEIDFNNNSIVLGKCEIWRMEGGSGHTVTDDIDHFFSAPSITYREPHL 1200
DKIMMPQDDLVISEIDFNNNSITLGKCEIWRMEGGSGHTVTDDIDHFFSAPSITYREPHL 1200
DKIMMPQDDLVISEIDFNNNSITLGKCEIWRMEGGSGHTVTDDIDHFFSAPSITYREPHL 1200
**********************.************************************

SIYDVLEVQKEELDLSKDLMVLPNAPNRVFAWETGWTPGLRSLENDGTKLLDRIRDNYEG 1260
SIYDVLEVQKEELDLSKDLMVLPNAPNRVFAWETGWTPGLRSLENDGTKLLDRIRDNYEG 1260
SIYDVLEVQKEELDLSKDLMVLPNAPNRVFAWETGWTPGLRSLENDGTKLLDRIRDNYEG 1260
SIYDVLEVQKEELDLSKDLMVLPNAPNRVFAWETGWTPGLRSLENDGTKLLDRIRDNYEG 1260
SIYDVLEVQKEELDLSKDLMVLPNAPNRVFAWETGWTPGLRSLENDGTKLLDRIRDNYEG 1260
************************************************************

EFYWRYFAFIADALITTLKPRYEDTNIRINLDSNTRSFIVPIITTEYIREKLSYSFYGSG 1320
EFYWRYFAFIADALITTLKPRYEDTNIRINLDSNTRSFIVPIITTEYIREKLSYSFYGSG 1320
EFYWRYFAFIADALITTLKPRYEDTNIRINLDSNTRSFIVPIITTEYIREKLSYSFYGSG 1320
EFYWRYFAFIADALITTLKPRYEDTNIRINLDSNTRSFIVPVITTEYIREKLSYSFYGSG 1320
EFYWRYFAFIADALITTLKPRYEDTNIRINLDSNTRSFIVPVITTEYIREKLSYSFYGSG 1320
****************************************:*******************

GTYALSLSQYNMGINIELSESDVWIIDVDNVVRDVTIESDKIKKGDLIEGILSTLSIEEN 1380
GTYALSLSQYNMGINIELSESDVWIIDVDNVVRDVTIESDKIKKGDLIEGILSTLSIEEN 1380
GTYALSLSQYNMGINIELSESDVWIIDVDNVVRDVTIESDKIKKGDLIEGILSTLSIEEN 1380
```

FIG. 2D

```
GTYALSLSQYNMNINIELNENDTWVIDVDNVVRDVTIESDKIKKGDLIENILSKLSIEDN 1380
GTYALSLSQYNMNINIELNENDTWVIDVDNVVRDVTIESDKIKKGDLIENILSKLSIEDN 1380
************.*****.*.*.*:************************.***.****:*

KIILNSHEINFSGEVNGSNGFVSLTFSILEGINAIIEVDLLSKSYKLLISGELKILMLNS 1440
KIILNSHEINFSGEVNGSNGFVSLTFSILEGINAIIEVDLLSKSYKLLISGELKILMLNS 1440
KIILNSHEINFSGEVNGSNGFVSLTFSILEGINAIIEVDLLSKSYKLLISGELKILMLNS 1440
KIILDNHEINFSGTLNGGNGFVSLTFSILEGINAVIEVDLLSKSYKVLISGELKTLMANS 1440
KIILDNHEINFSGTLNGGNGFVSLTFSILEGINAVIEVDLLSKSYKVLISGELKTLMANS 1440
****:.******* :**.****************:***********:******* ** **

NHIQQKIDYIGFNSELQKNIPYSFVDSEGKENGFINGSTKEGLFVSELPDVVLISKVYMD 1500
NHIQQKIDYIGFNSELQKNIPYSFVDSEGKENGFINGSTKEGLFVSELPDVVLISKVYMD 1500
NHIQQKIDYIGFNSELQKNIPYSFVDSEGKENGFINGSTKEGLFVSELPDVVLISKVYMD 1500
NSVQQKIDYIGLNSELQKNIPYSFMDDKGKENGFINCSTKEGLFVSELSDVVLISKVYMD 1500
NSVQQKIDYIGLNSELQKNIPYSFMDDKGKENGFINCSTKEGLFVSELSDVVLISKVYMD 1500
* :********:************:*.:******** ***********.**********

DSKPSFGYYSNNLKDVKVITKDNVNILTGYYLKDDIKISLSLTLQDEKTIKLNSVHLDES 1560
DSKPSFGYYSNNLKDVKVITKDNVNILTGYYLKDDIKISLSLTLQDEKTIKLNSVHLDES 1560
DSKPSFGYYSNNLKDVKVITKDNVNILTGYYLKDDIKISLSLTLQDEKTIKLNSVHLDES 1560
NSKPLFGYCSNDLKDVKVITKDDVIILTGYYLKDDIKISLSFTIQDENTIKLNGVYLDEN 1560
NSKPLFGYCSNDLKDVKVITKDDVIILTGYYLKDDIKISLSFTIQDENTIKLNGVYLDEN 1560
:*** *** **:**********:* *****************:*:***:*****.*:***.

GVAEILKFMNRKGNTNTSDSLMSFLESMNIKSIFVNFLQSNIKFILDANFIISGTTSIGQ 1620
GVAEILKFMNRKGNTNTSDSLMSFLESMNIKSIFVNFLQSNIKFILDANFIISGTTSIGQ 1620
GVAEILKFMNRKGNTNTSDSLMSFLESMNIKSIFVNFLQSNIKFILDANFIISGTTSIGQ 1620
GVAEILKFMNKKGSTNTSDSLMSFLESMNIKSIFINSLQSNTKLILDTNFIISGTTSIGQ 1620
GVAEILKFMNKKGSTNTSDSLMSFLESMNIKSIFINSLQSNTKLILDTNFIISGTTSIGQ 1620
**********:**.*********************:* **** *:***:************

FEFICDENDNIQPYFIKFNTLETNYTLYVGNRQNMIVEPNYDLDDSGDISSTVINFSQKY 1680
FEFICDENDNIQPYFIKFNTLETNYTLYVGNRQNMIVEPNYDLDDSGDISSTVINFSQKY 1680
FEFICDENDNIQPYFIKFNTLETNYTLYVGNRQNMIVEPNYDLDDSGDISSTVINFSQKY 1680
FEFICDKDNNIQPYFIKFNTLETKYTLYVGNRQNMIVEPNYDLDDSGDISSTVINFSQKY 1680
FEFICDKDNNIQPYFIKFNTLETKYTLYVGNRQNMIVEPNYDLDDSGDISSTVINFSQKY 1680
******:::***************:************************************

LYGIDSCVNKVVISPNIYTDEINITPVYETNNTYPEVIVLDANYINEKINVNINDLSIRY 1740
LYGIDSCVNKVVISPNIYTDEINITPVYETNNTYPEVIVLDANYINEKINVNINDLSIRY 1740
LYGIDSCVNKVVISPNIYTDEINITPVYETNNTYPEVIVLDANYINEKINVNINDLSIRY 1740
LYGIDSCVNKVIISPNIYTDEINITPIYEANNTYPEVIVLDTNYISEKINININDLSIRY 1740
LYGIDSCVNKVIISPNIYTDEINITPIYEANNTYPEVIVLDTNYISEKINININDLSIRY 1740
**********:***************:**:***********:***.****:*********

VWSNDGNDFILMSTSEENKVSQVKIRFVNVFKDKTLANKLSFNFSDKQDVPVSEIILSFT 1800
VWSNDGNDFILMSTSEENKVSQVKIRFVNVFKDKTLANKLSFNFSDKQDVPVSEIILSFT 1800
VWSNDGNDFILMSTSEENKVSQVKIRFVNVFKDKTLANKLSFNFSDKQDVPVSEIILSFT 1800
VWSNDGSDFILMSTDEENKVSQVKIRFTNVFKGNTISDKISFNFSDKQDVSINKVISTFT 1800
VWSNDGSDFILMSTDEENKVSQVKIRFTNVFKGNTISDKISFNFSDKQDVSINKVISTFT 1800
******.*******.************.****.:*:::*:**********.:.::* :**
```

FIG. 2E

```
PSYYEDGLIGYDLGLVSLYNEKFYINNFGMMVSGLIYINDSLYYFKPPVNNLITGFVTVG 1860
PSYYEDGLIGYDLGLVSLYNEKFYINNFGMMVSGLIYINDSLYYFKPPVNNLITGFVTVG 1860
PSYYEDGLIGYDLGLVSLYNEKFYINNFGMMVSGLIYINDSLYYFKPPVNNLITGFVTVG 1860
PSYYVEGLLNYDLGLISLYNEKFYINNFGMMVSGLVYINDSLYYFKPPIKNLITGFTTIG 1860
PSYYVEGLLNYDLGLISLYNEKFYINNFGMMVSGLVYINDSLYYFKPPIKNLITGFTTIG 1860
**** :**:.*****:********************:************::******.*:*

DDKYYFNPINGGAASIGETIIDDKNYYFNQSGVLQTGVFSTEDGFKYFAPANTLDENLEG 1920
DDKYYFNPINGGAASIGETIIDDKNYYFNQSGVLQTGVFSTEDGFKYFAPANTLDENLEG 1920
DDKYYFNPINGGAASIGETIIDDKNYYFNQSGVLQTGVFSTEDGFKYFAPANTLDENLEG 1920
DDKYYFNPDNGGAASVGETIIDGKNYYFSQNGVLQTGVFSTEDGFKYFAPADTLDENLEG 1920
DDKYYFNPDNGGAASVGETIIDGKNYYFSQNGVLQTGVFSTEDGFKYFAPADTLDENLEG 1920
******** ******:******.*****.*.*********************:*********

EAIDFTGKLIIDENIYYFDDNYRGAVEWKELDGEMHYFSPETGKAFKGLNQIGDYKYYFN 1980
EAIDFTGKLIIDENIYYFDDNYRGAVEWKELDGEMHYFSPETGKAFKGLNQIGDYKYYFN 1980
EAIDFTGKLIIDENIYYFDDNYRGAVEWKELDGEMHYFSPETGKAFKGLNQIGDYKYYFN 1980
EAIDFTGKLTIDENVYYFGDNYRAAIEWQTLDDEVYYFSTDTGRAFKGLNQIGDDKFYFN 1980
EAIDFTGKLTIDENVYYFGDNYRAAIEWQTLDDEVYYFSTDTGRAFKGLNQIGDDKFYFN 1980
********* ****:***.****.*:**: **.*::***.:**;********** *:***

SDGVMQKGFVSINDNKHYFDDSGVMKVGYTEIDGKHFYFAENGEMQIGVFNTEDGFKYFA 2040
SDGVMQKGFVSINDNKHYFDDSGVMKVGYTEIDGKHFYFAENGEMQIGVFNTEDGFKYFA 2040
SDGVMQKGFVSINDNKHYFDDSGVMKVGYTEIDGKHFYFAENGEMQIGVFNTEDGFKYFA 2040
SDGIMQKGFVNINDKTFYFDDSGVMKSGYTEIDGKYFYFAENGEMQIGVFNTADGFKYFA 2040
SDGIMQKGFVNINDKTFYFDDSGVMKSGYTEIDGKYFYFAENGEMQIGVFNTADGFKYFA 2040
***:******.***:.*********  ********:**************** *******

HHNEDLGNEEGEEISYSGILNFNNKIYYFDDSFTAVVGWKDLEDGSKYYFDEDTAEAYIG 2100
HHNEDLGNEEGEEISYSGILNFNNKIYYFDDSFTAVVGWKDLEDGSKYYFDEDTAEAYIG 2100
HHNEDLGNEEGEEISYSGILNFNNKIYYFDDSFTAVVGWKDLEDGSKYYFDEDTAEAYIG 2100
HHDEDLGNEEGEALSYSGILNFNNKIYYFDDSFTAVVGWKDLEDGSKYYFDEDTAEAYIG 2100
HHDEDLGNEEGEALSYSGILNFNNKIYYFDDSFTAVVGWKDLEDGSKYYFDEDTAEAYIG 2100
**:*********  :************************************************

LSLINDGQYYFNDDGIMQVGFVTINDKVFYFSDSGIIESGVQNIDDNYFYIDDNGIVQIG 2160
LSLINDGQYYFNDDGIMQVGFVTINDKVFYFSDSGIIESGVQNIDDNYFYIDDNGIVQIG 2160
LSLINDGQYYFNDDGIMQVGFVTINDKVFYFSDSGIIESGVQNIDDNYFYIDDNGIVQIG 2160
ISIINDGKYYFNDSGIMQIGFVTINNEVFYFSDSGIVESGMQNIDDNYFYIDENGLVQIG 2160
ISIINDGKYYFNDSGIMQIGFVTINNEVFYFSDSGIVESGMQNIDDNYFYIDENGLVQIG 2160
:*:****:*****.****:******::*********:***:***********:**:****

VFDTSDGYKYFAPANTVNDNIYGQAVEYSGLVRVGEDVYYFGETYTIETGWIYDMENESD 2220
VFDTSDGYKYFAPANTVNDNIYGQAVEYSGLVRVGEDVYYFGETYTIETGWIYDMENESD 2220
VFDTSDGYKYFAPANTVNDNIYGQAVEYSGLVRVGEDVYYFGETYTIETGWIYDMENESD 2220
VFDTSDGYKYFAPANTVNDNIYGQAVEYSGLVRVGEDVYYFGETYTIETGWIYDMENESD 2220
VFDTSDGYKYFAPANTVNDNIYGQAVEYSGLVRVGEDVYYFGETYTIETGWIYDMENESD 2220
************************************************************
```

Fig 2F

```
KYYFNPETKKACKGINLIDDIKYYFDEKGIMRTGLISFENNNYYFNENGEMQFGYINIED 2280
KYYFNPETKKACKGINLIDDIKYYFDEKGIMRTGLISFENNNYYFNENGEMQFGYINIED 2280
KYYFNPETKKACKGINLIDDIKYYFDEKGIMRTGLISFENNNYYFNENGEMQFGYINIED 2280
KYYFDPETKKAYKGINVIDDIKYYFDENGIMRTGLITFEDNHYYFNEDGIMQYGYLNIED 2280
KYYFDPETKKAYKGINVIDDIKYYFDENGIMRTGLITFEDNHYYFNEDGIMQYGYLNIED 2280
****:****** ****:**********:********:**:*:*****:* **:**:****

KMFYFGEDGVMQIGVFNTPDGFKYFAHQNTLDENFEGESINYTGWLDLDEKRYYFTDEYI 2340
KMFYFGEDGVMQIGVFNTPDGFKYFAHQNTLDENFEGESINYTGWLDLDEKRYYFTDEYI 2340
KMFYFGEDGVMQIGVFNTPDGFKYFAHQNTLDENFEGESINYTGWLDLDEKRYYFTDEYI 2340
KTFYFSEDGIMQIGVFNTPDGFKYFAHQNTLDENFEGESINYTGWLDLDEKRYYFTDEYI 2340
KTFYFSEDGIMQIGVFNTPDGFKYFAHQNTLDENFEGESINYTGWLDLDEKRYYFTDEYI 2340
* ***.***:**************************************************

AATGSVIIDGEEYYFDPDTAQLVISE 2366 (SEQ ID NO: 2, 630)
AATGSVIIDGEEYYFDPDTAQLVISE 2366 (SEQ ID NO: 25, VPI10463)
AATGSVIIDGEEYYFDPDTAQLVISE 2366 (SEQ ID NO: 6)
AATGSVIIDGEEYYFDPDTAQLVISE 2366 (SEQ ID NO: 21, R20291)
AATGSVIIDGEEYYFDPDTAQLVISE 2366 (SEQ ID NO: 23, CD196)
**************************
```

FIG. 3

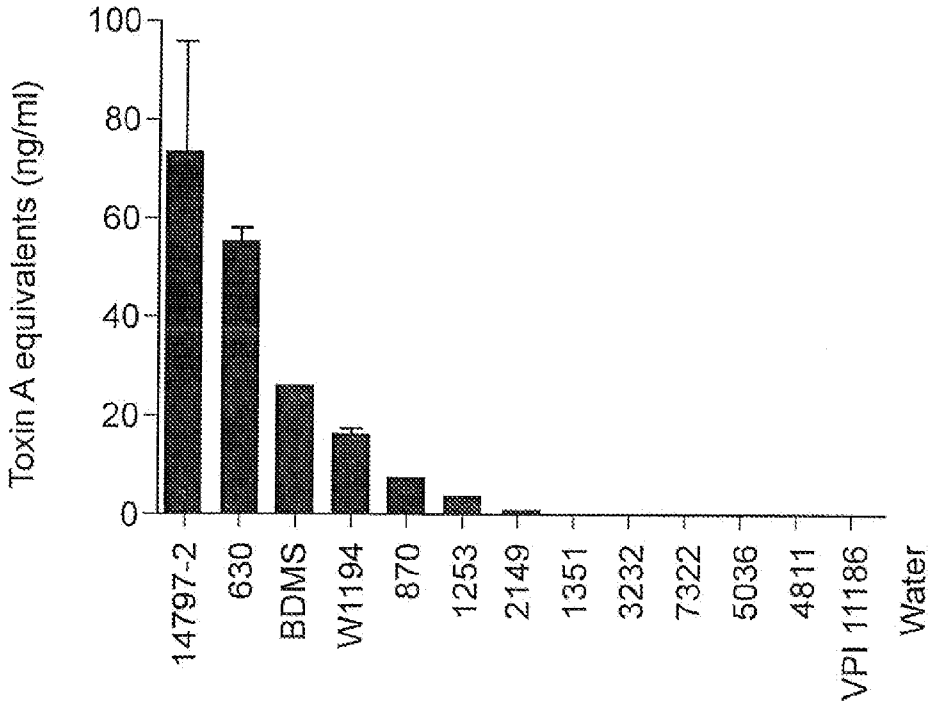

Toxin A equivalents (ng/ml)
100
80
60
40
20
0
14797-2
630
BDMS
W1194
870
1253
2149
1351
3232
7322
5036
4811
VPI 11186
Water

FIG. 4A

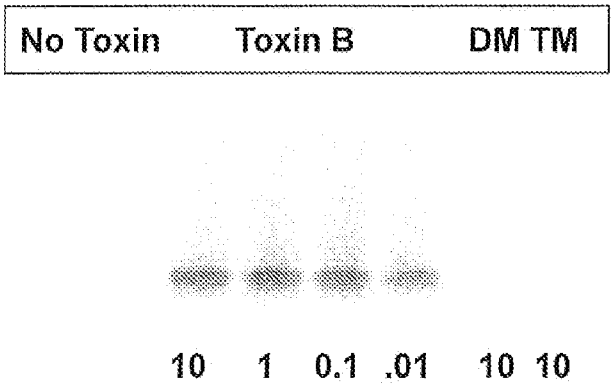

No Toxin
Toxin B
DM TM
µg
10
1
0.1
.01
10
10

FIG. 4B

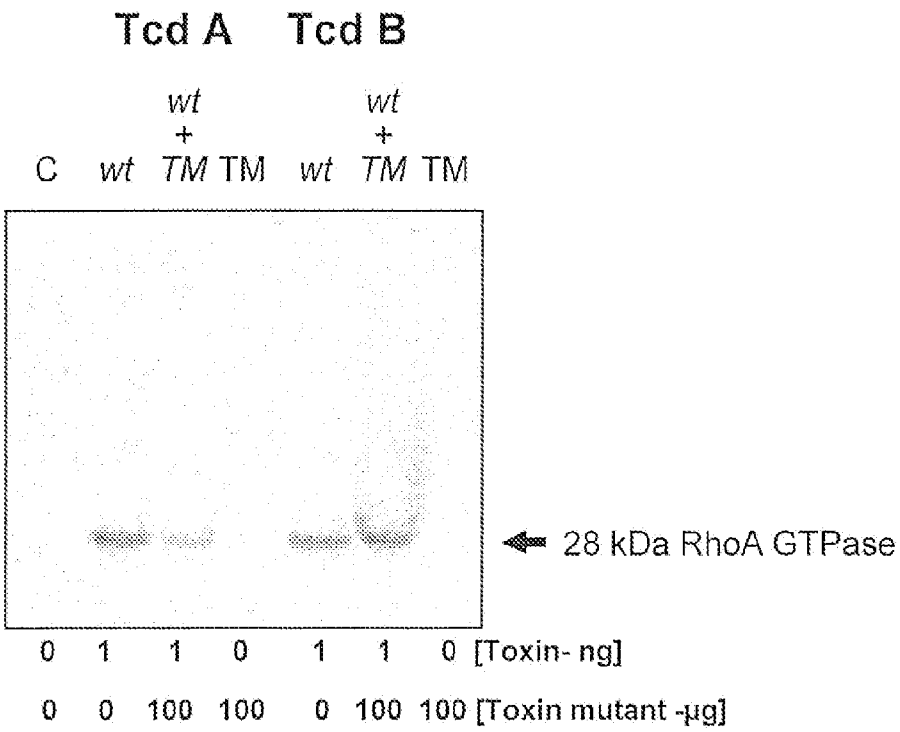

Tcd A
Tcd B
C
wt
wt + TM
TM
wt
wt + TM
TM
28 kDa RhoA GTPase
0 1 1 0 1 1 0 [Toxin- ng]
0 0 100 100 0 100 100 [Toxin mutant -µg]

FIG. 5

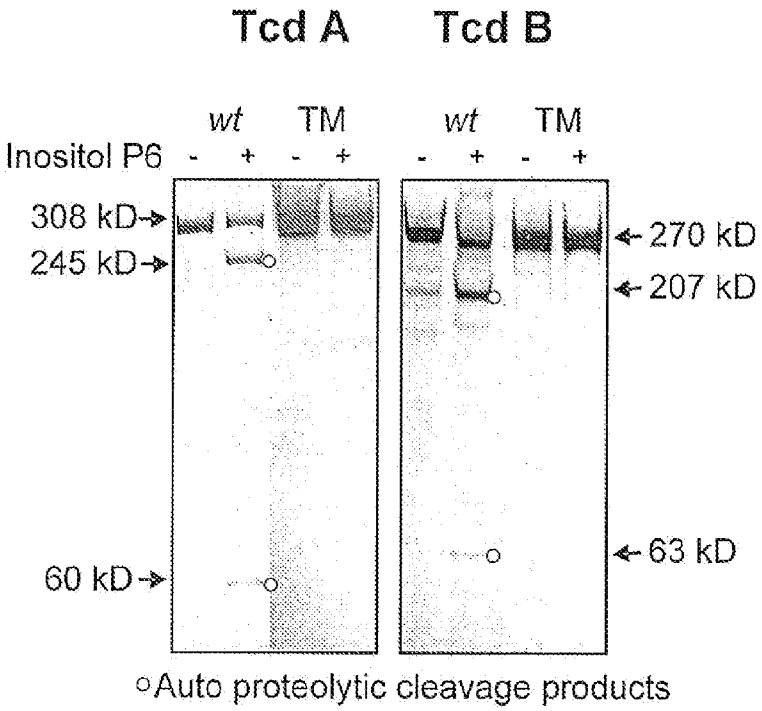

Tcd A
Tcd B
wt
TM
wt
TM
Inositol P6 - + - + - + - +
308 kD
245 kD
60 kD
270 kD
207 kD
63 kD
○Auto proteolytic cleavage products

FIG. 6

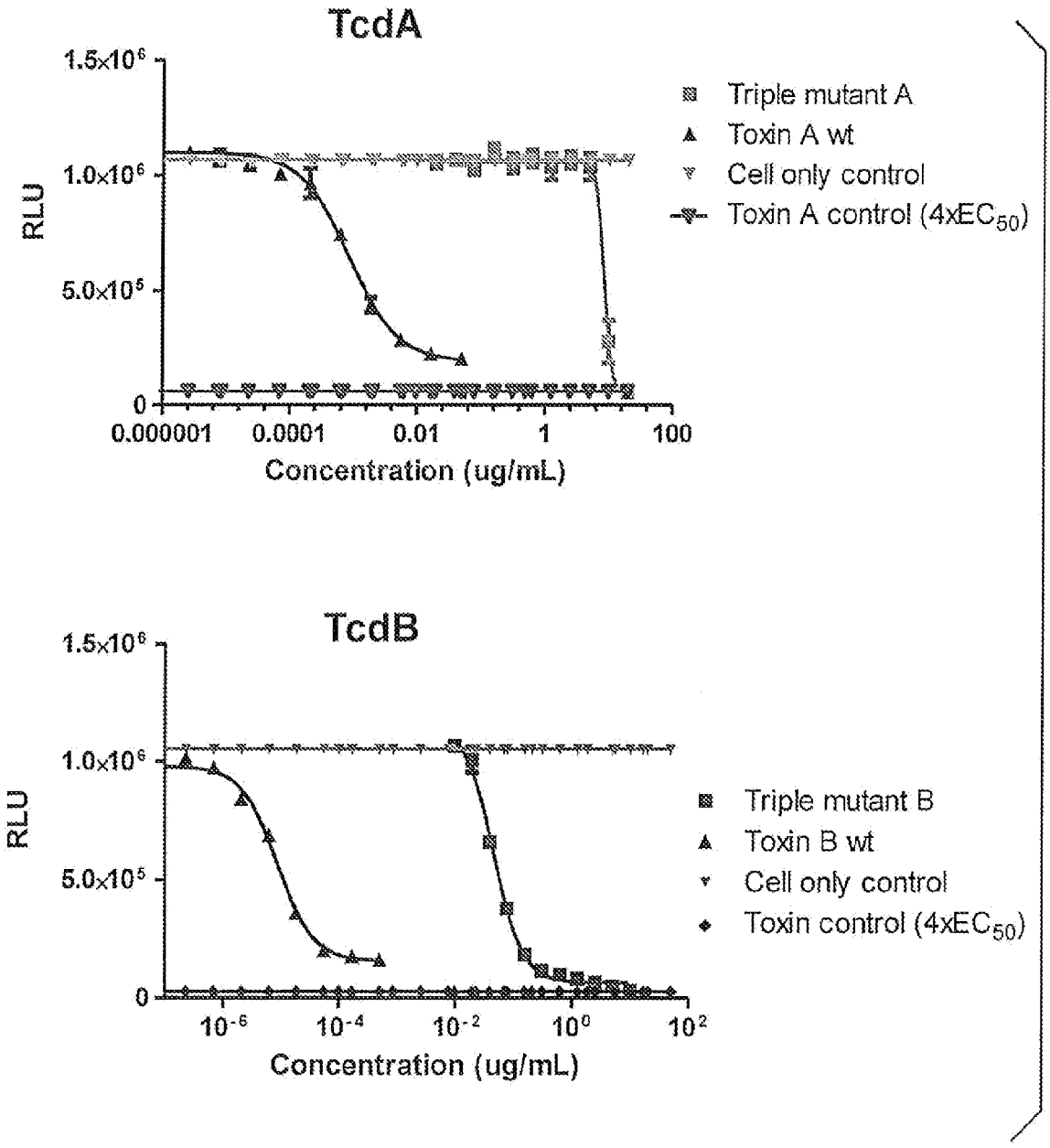
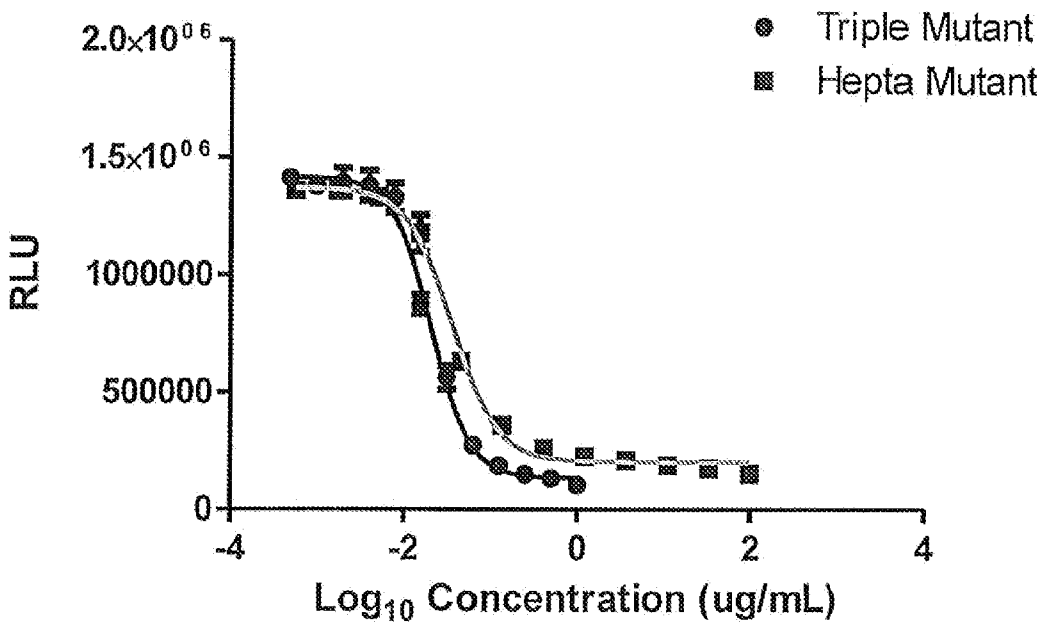

TcdA
1.5x10^6
1.0x10^6
5.0x10^5
0
RLU
0.000001
0.0001
0.01
1
100
Concentration (ug/mL)
Triple mutant A
Toxin A wt
Cell only control
Toxin A control (4xEC50)
TcdB
1.5x10^6
1.0x10^6
5.0x10^5
0
RLU
10^-6
10^-4
10^-2
10^0
10^2
Concentration (ug/mL)
Triple mutant B
Toxin B wt
Cell only control
Toxin control (4xEC50)

FIG. 7



	Triple Mutant	Hepta Mutant
EC_{50}	0.02078	0.03590

FIG. 8

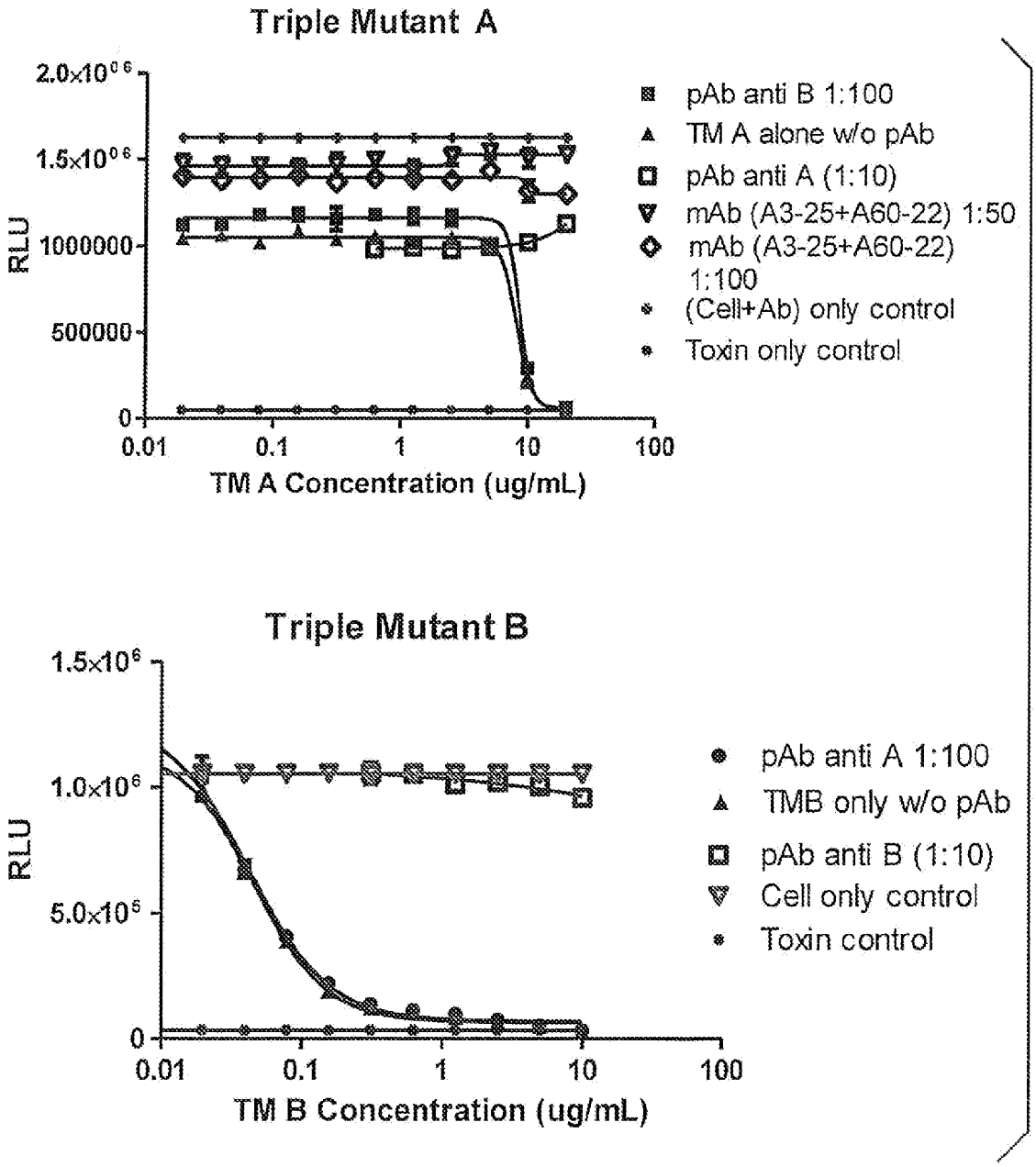

Triple Mutant A
RLU
2.0x10^06
1.5x10^06
1000000
500000
0
0.01
0.1
1
10
100
TM A Concentration (ug/mL)
pAb anti B 1:100
TM A alone w/o pAb
pAb anti A (1:10)
mAb (A3-25+A60-22) 1:50
mAb (A3-25+A60-22) 1:100
(Cell+Ab) only control
Toxin only control
Triple Mutant B
RLU
1.5x10^6
1.0x10^6
5.0x10^5
0
0.01
0.1
1
10
100
TM B Concentration (ug/mL)
pAb anti A 1:100
TMB only w/o pAb
pAb anti B (1:10)
Cell only control
Toxin control

FIG. 9

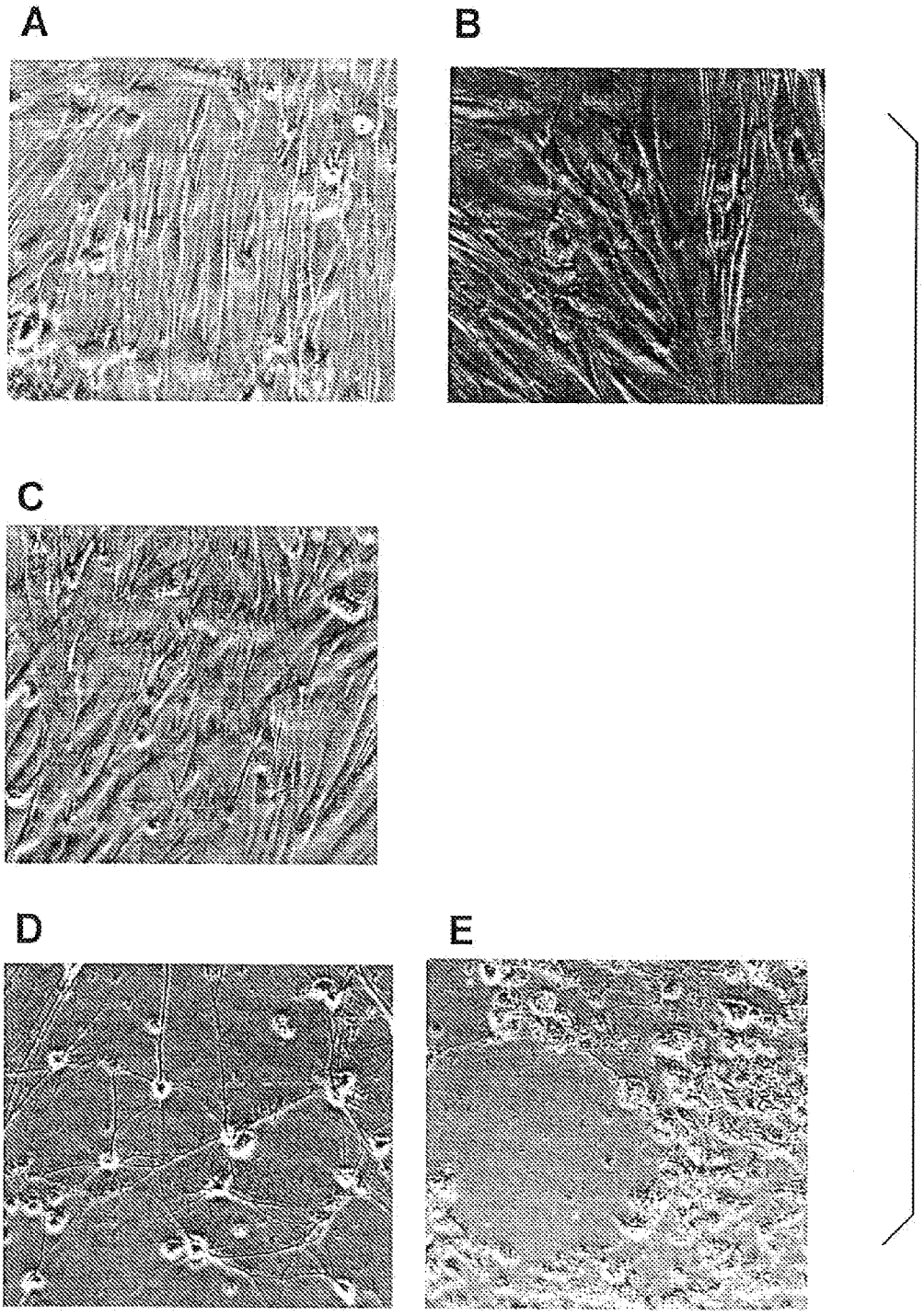


FIG. 10

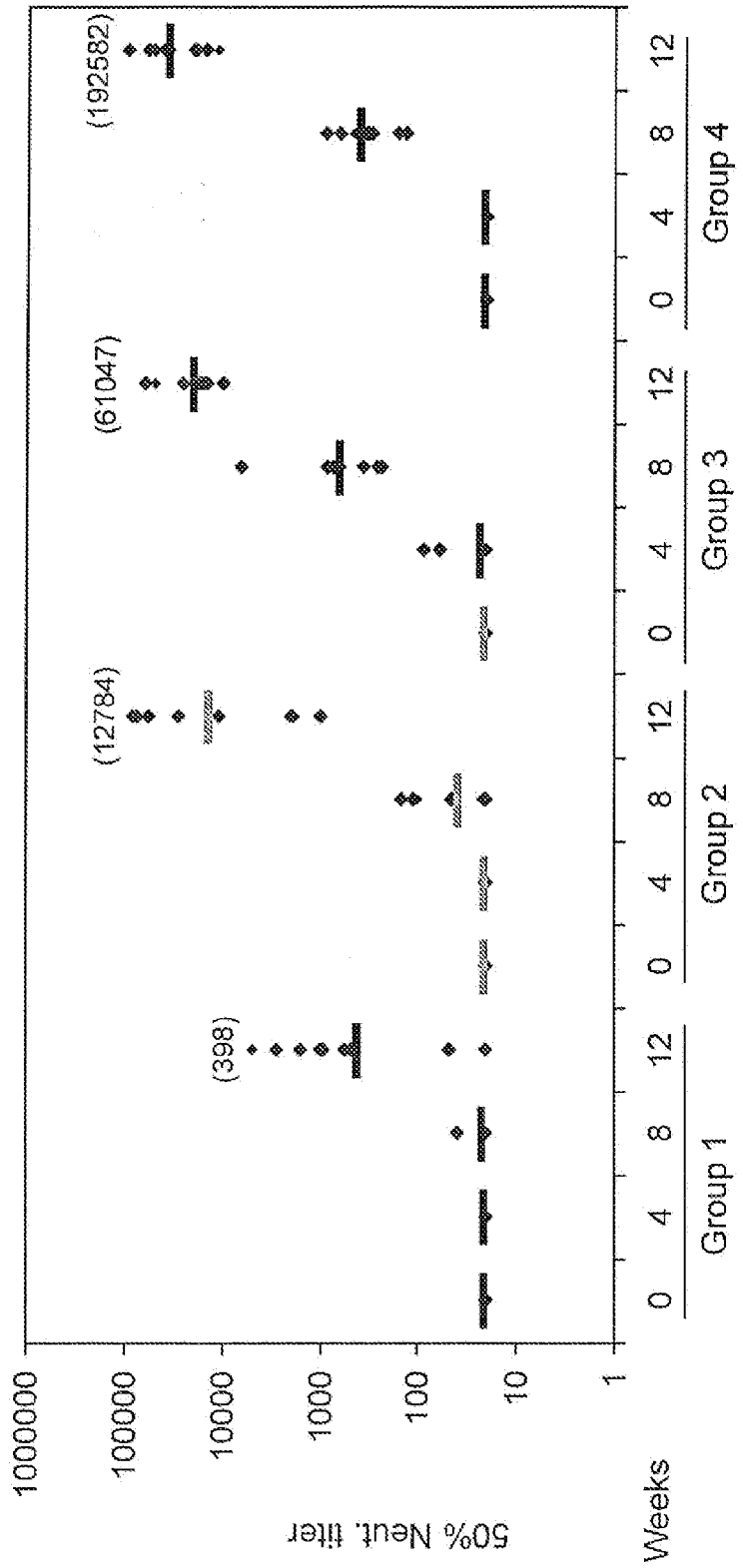

50% Neut. titer
1000000
100000
10000
1000
100
10
1
(398)
(12784)
(61047)
(192582)
Weeks
0 4 8 12 0 4 8 12 0 4 8 12 0 4 8 12
Group 1
Group 2
Group 3
Group 4

FIG. 11A

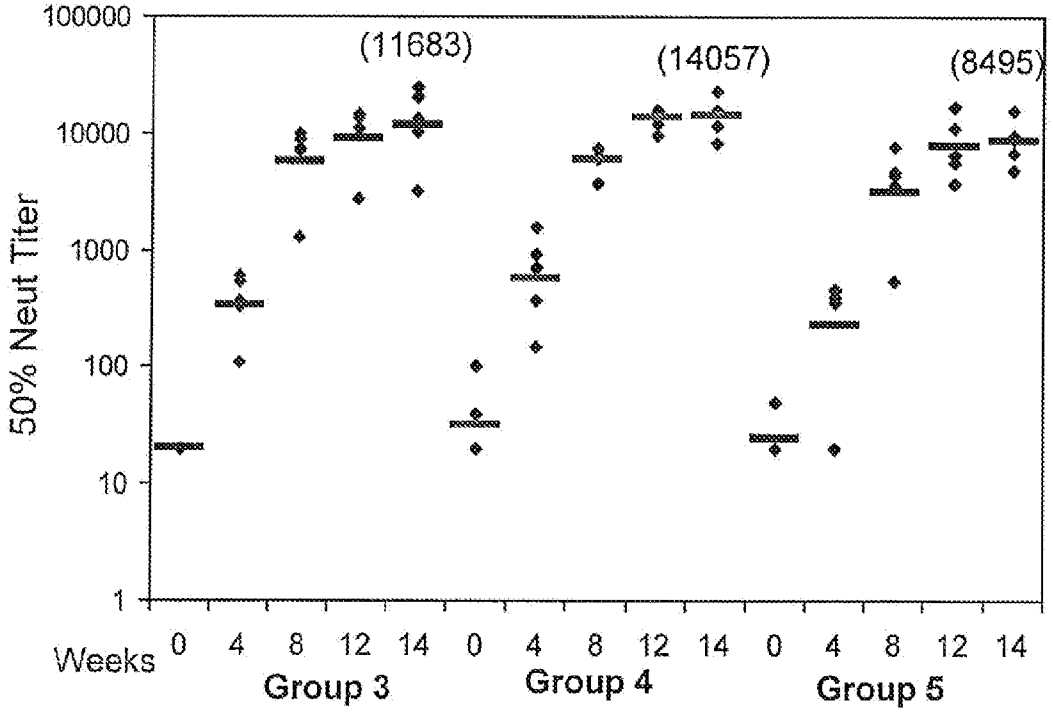


FIG. 11B

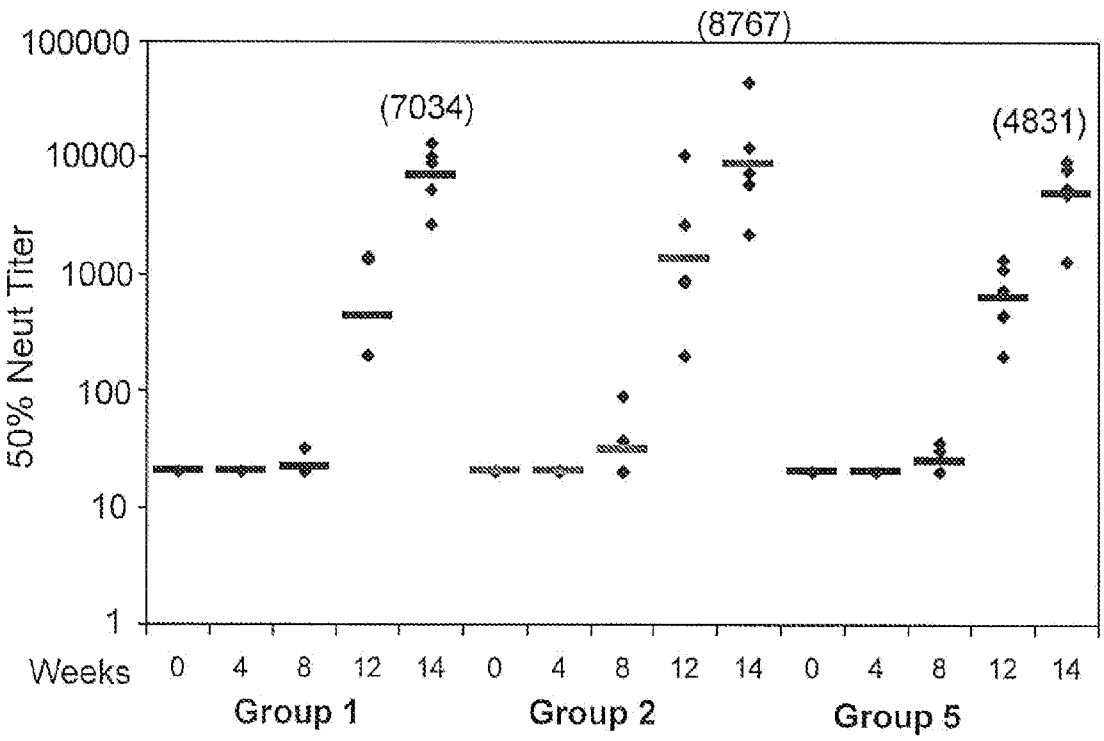


FIG. 12

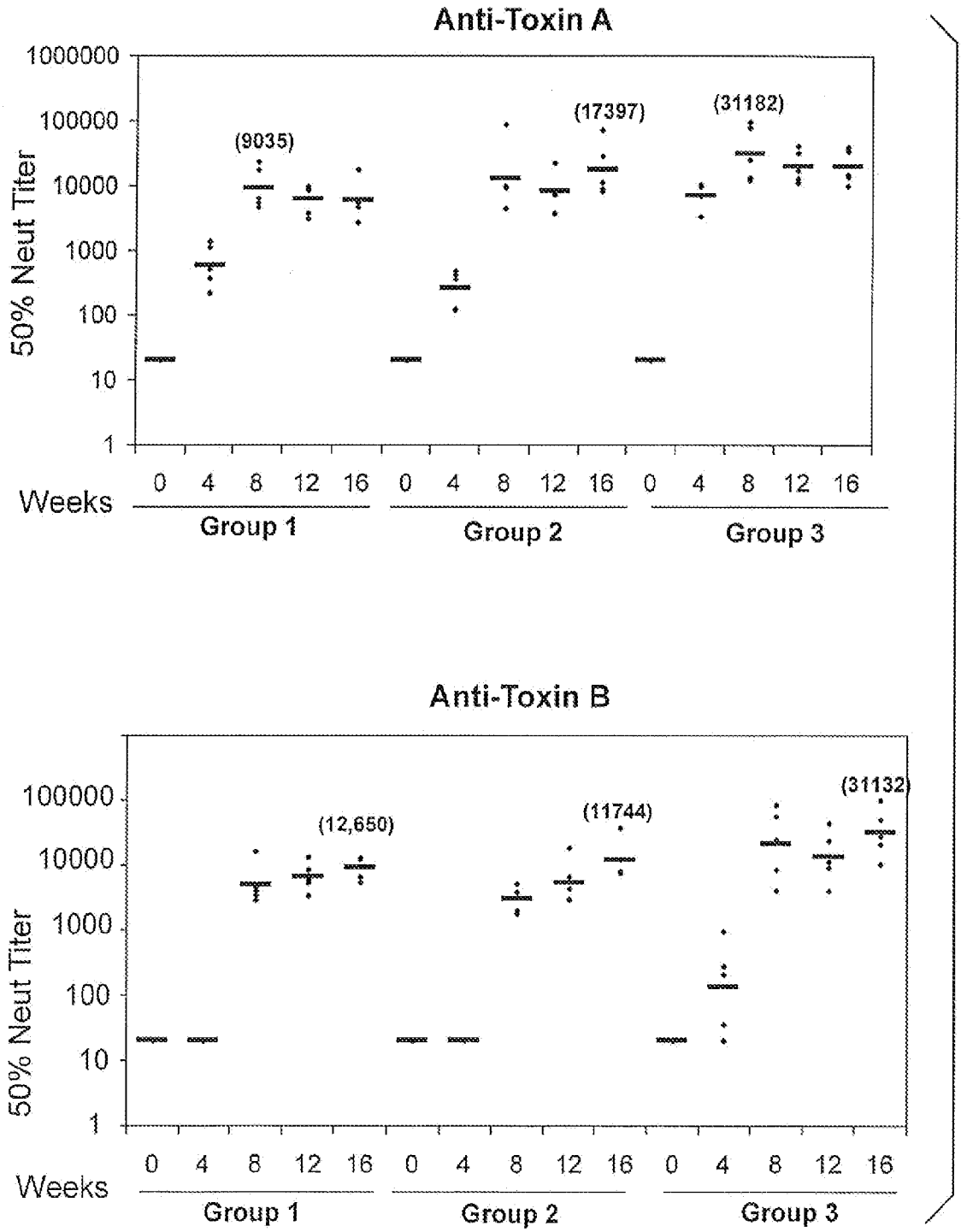

Anti-Toxin A
1000000
100000
10000
1000
100
10
1
50% Neut Titer
(9035)
(17397)
(31182)
Weeks
0 4 8 12 16 0 4 8 12 16 0 4 8 12 16
Group 1
Group 2
Group 3
Anti-Toxin B
100000
10000
1000
100
10
1
50% Neut Titer
(12,650)
(11744)
(31132)
Weeks
0 4 8 12 16 0 4 8 12 16 0 4 8 12 16
Group 1
Group 2
Group 3

FIG. 13

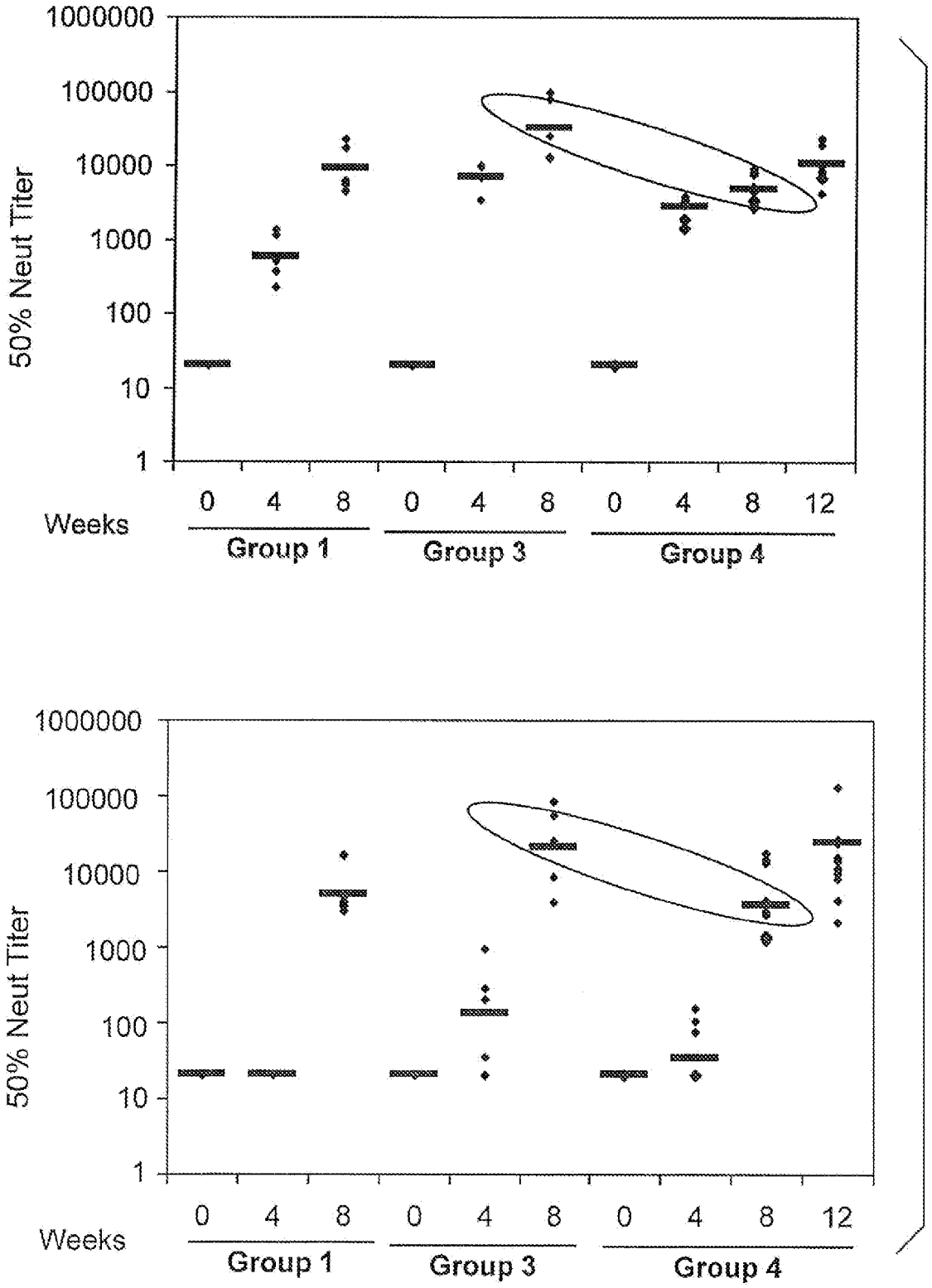

1000000
100000
10000
1000
100
10
1
50% Neut Titer
Weeks
0 4 8 0 4 8 0 4 8 12
Group 1
Group 3
Group 4
1000000
100000
10000
1000
100
10
1
50% Neut Titer
Weeks
0 4 8 0 4 8 0 4 8 12
Group 1
Group 3
Group 4

FIG. 14

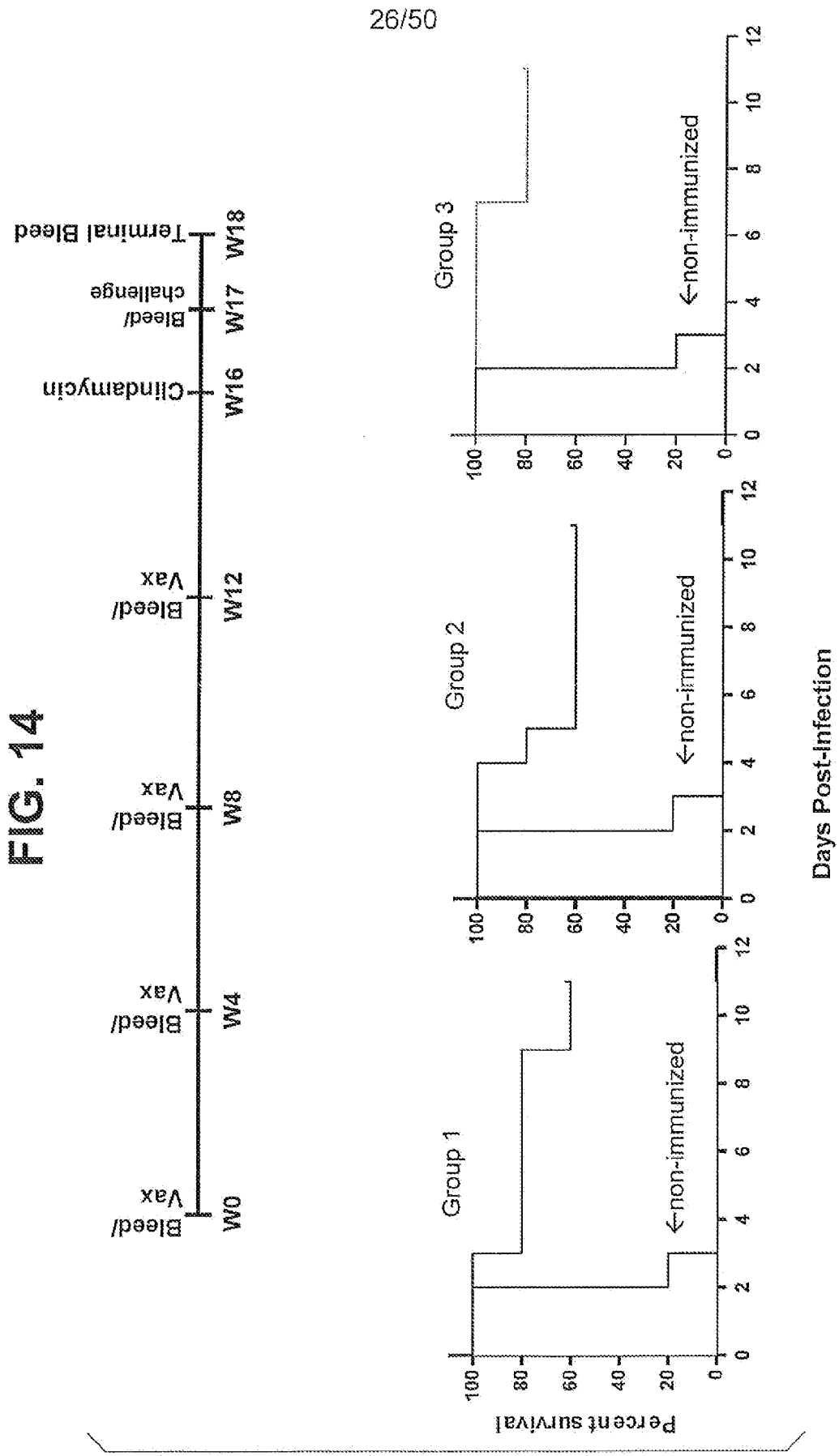

Bleed/ Vax
W0
Bleed/ Vax
W4
Bleed/ Vax
W8
Bleed/ Vax
W12
Clindamycin
W16
Bleed/ challenge
W17
Terminal Bleed
W18
Group 1
Group 2
Group 3
←non-immunized
Percent survival
Days Post-Infection
0
20
40
60
80
100
0
2
4
6
8
10
12

FIG. 15

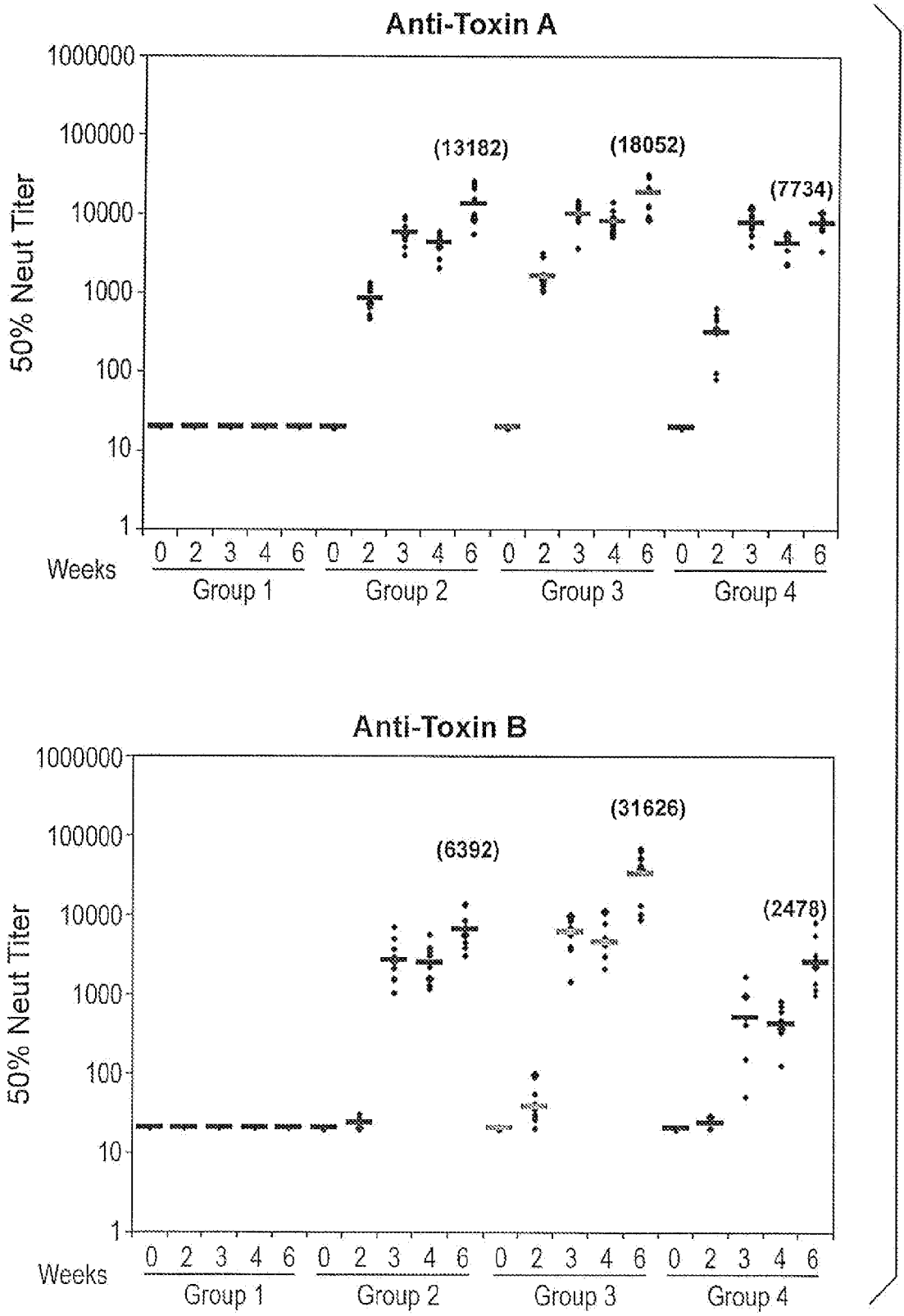

Anti-Toxin A
50% Neut Titer
1000000
100000
10000
1000
100
10
1
(13182)
(18052)
(7734)
Weeks
0 2 3 4 6
Group 1
Group 2
Group 3
Group 4
Anti-Toxin B
50% Neut Titer
1000000
100000
10000
1000
100
10
1
(6392)
(31626)
(2478)
Weeks
0 2 3 4 6
Group 1
Group 2
Group 3
Group 4

FIG. 16A

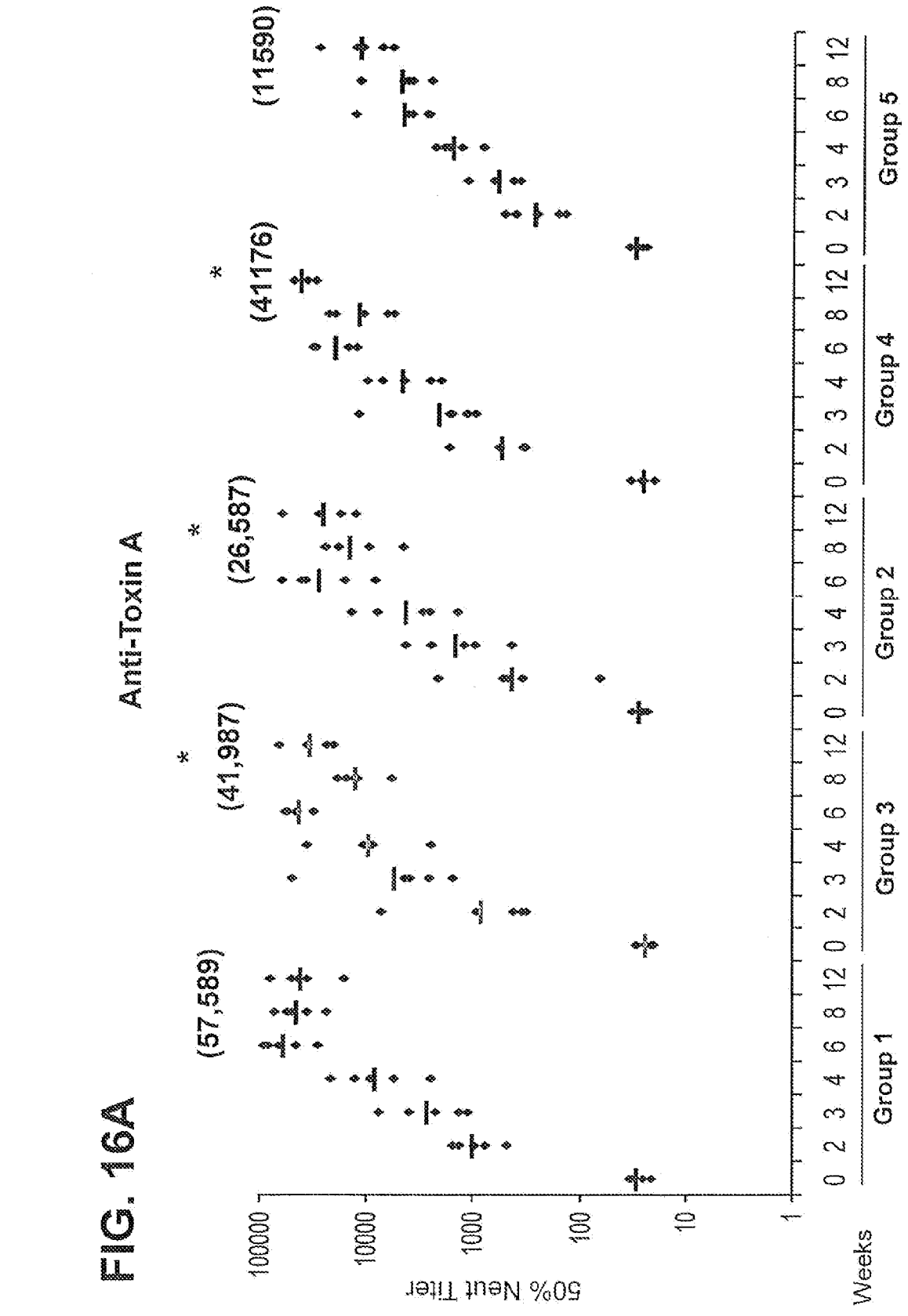

Anti-Toxin A
(57,589)
(41,987)
(26,587)
(41176)
(11590)
*
*
*
50% Neut Titer
100000
10000
1000
100
10
1
Weeks
0 2 3 4 6 8 12 0 2 3 4 6 8 12 0 2 3 4 6 8 12 0 2 3 4 6 8 12 0 2 3 4 6 8 12
Group 1
Group 3
Group 2
Group 4
Group 5

FIG. 16B

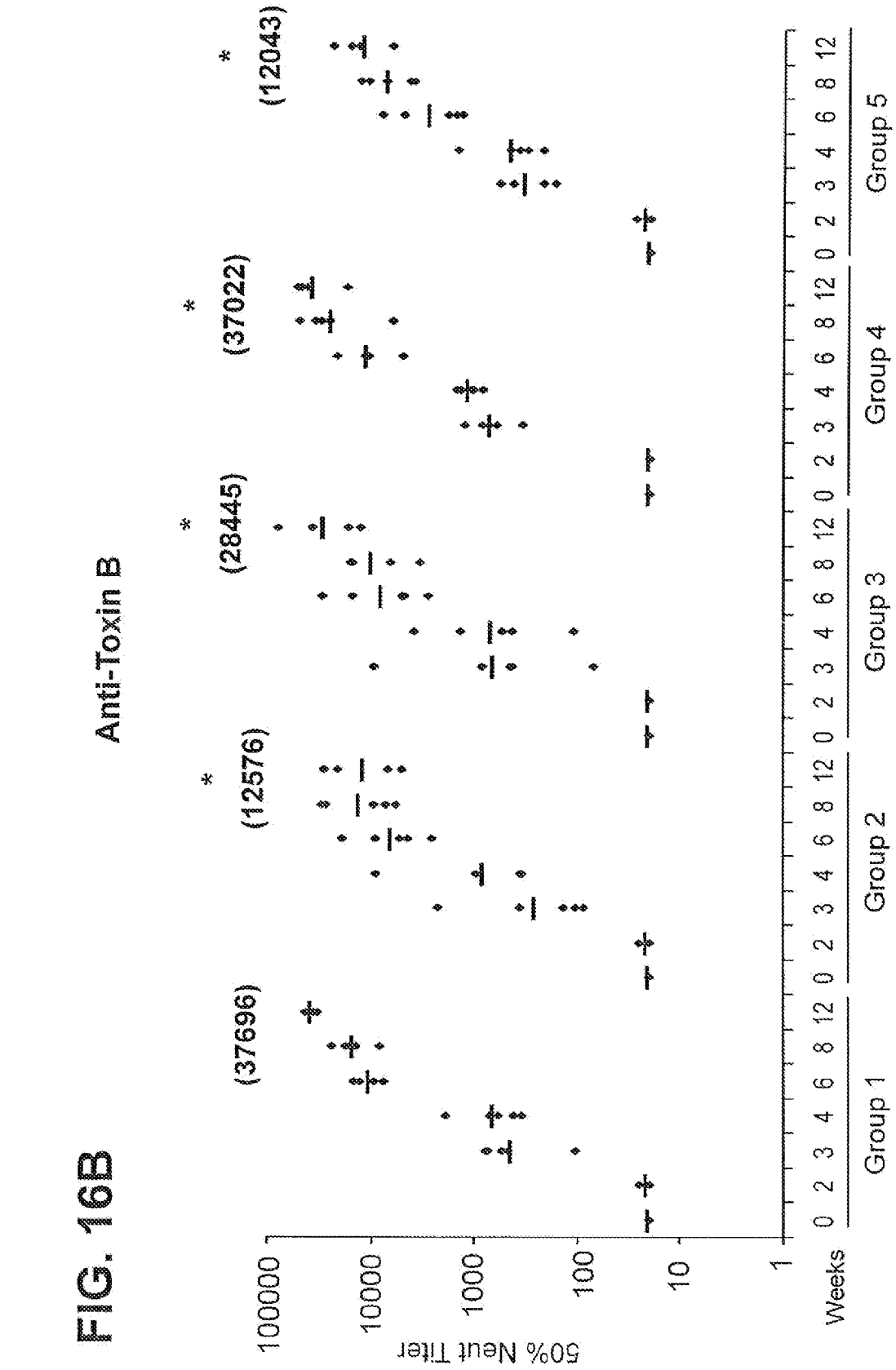

Anti-Toxin B
50% Neut Titer
100000
10000
1000
100
10
1
Weeks
0 2 3 4 6 8 12 0 2 3 4 6 8 12 0 2 3 4 6 8 12 0 2 3 4 6 8 12 0 2 3 4 6 8 12
Group 1
Group 2
Group 3
Group 4
Group 5
(37696)
(12576)
(28445)
(37022)
(12043)
*
*
*
*
*

FIG. 17

Variable Light Chain (muK)

MKLPVRLLVLMFWIPGSSSDVVMTHTPLSLPVSLGDQASMSCRS
SQSLIHSNGNTYLHWYLQKPGQSPKLLISKVSNRFSGVPDRFSG
SGSGTDFTLKISRVEAEDLGVYFCSQTTYFPYTFGGGTREIK**RAD**
AAPTVSIFPPSS (SEQ ID NO: 36)

Variable Heavy Chain (mIgE)

MYLGLNCVFIVFLLKGVQSEVNLEESGGGLVQPGGSMKLSCVAS
GFTFTNYWMNWVRQSPEKGLEWIAEIRLKSHNYATHFAESVKG
RFTISRDDSKSAVSLQMTNLTPEDTGIFYCTWDYYGNPAFVYWG
QGTLVTVSA**ASIRNPQLYPLKPCKGTASMTLGCLVKDYFPGPVT**
VTWYSDSLNMSTVN (SEQ ID NO: 37)

FIG. 18

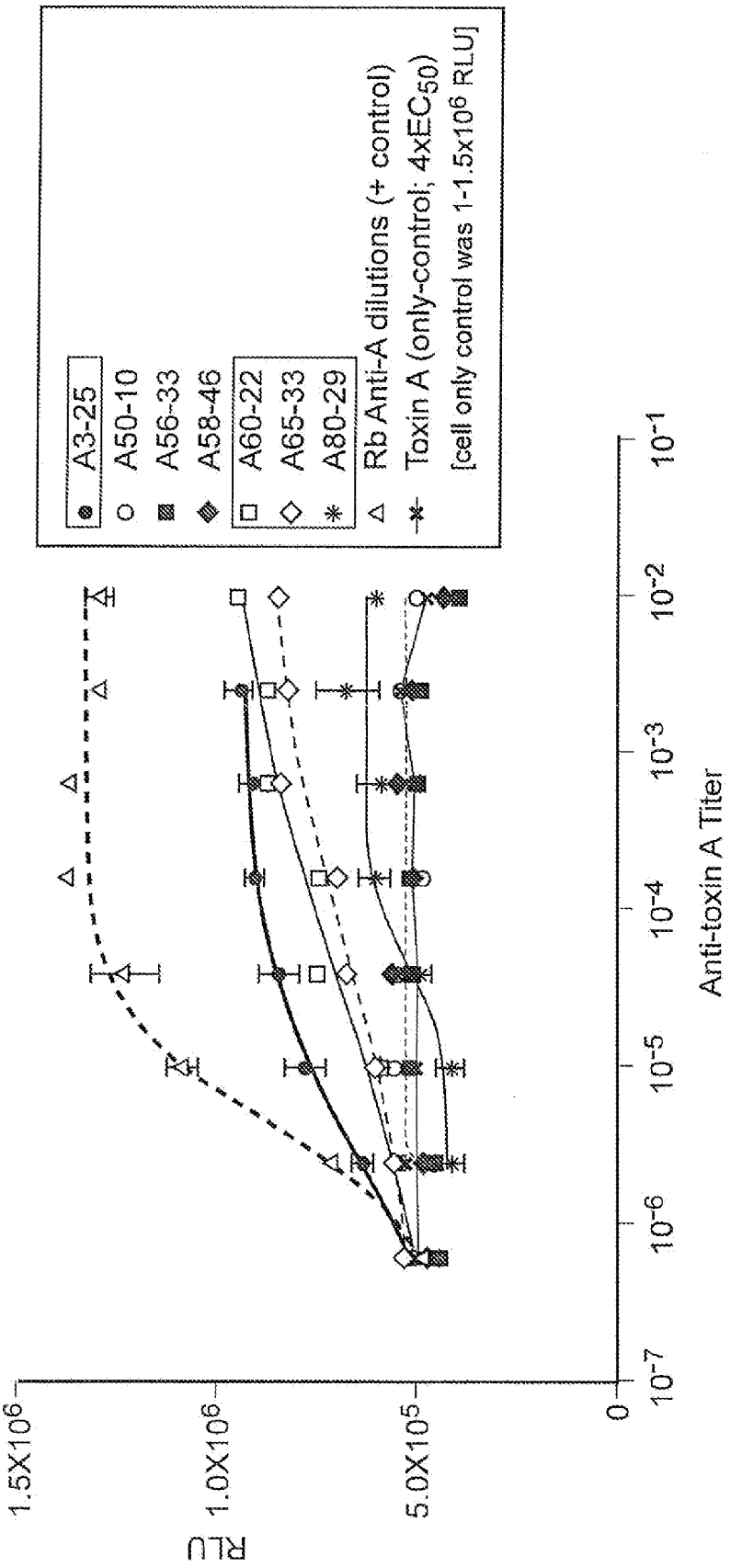

A3-25
A50-10
A56-33
A58-46
A60-22
A65-33
A80-29
Rb Anti-A dilutions (+ control)
Toxin A (only-control; 4xEC50)
[cell only control was 1-1.5x10^6 RLU]
RLU
1.5X10^6
1.0X10^6
5.0X10^5
0
10^-7
10^-6
10^-5
10^-4
10^-3
10^-2
10^-1
Anti-toxin A Titer

FIG. 19

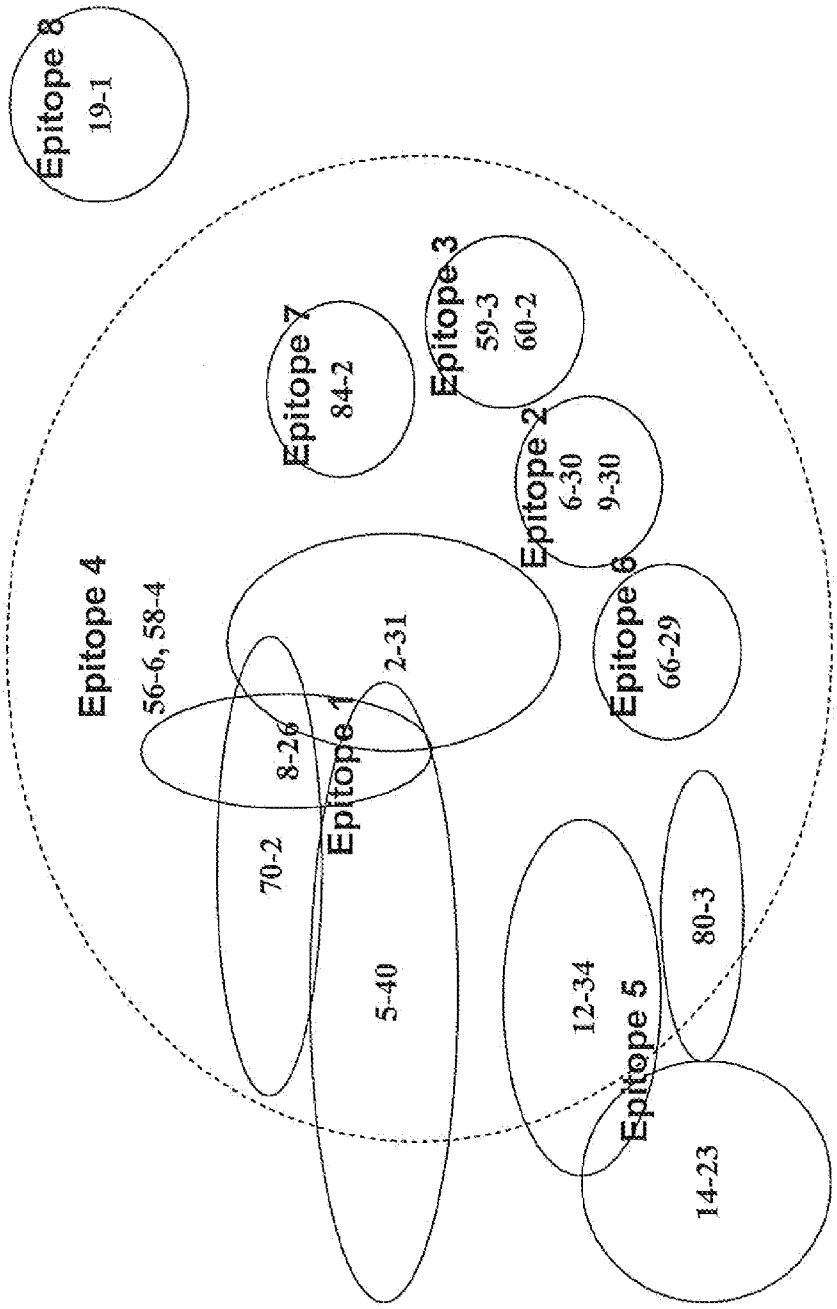

Epitope 8
19-1
Epitope 7
84-2
Epitope 3
59-3
60-2
Epitope 2
6-30
9-30
Epitope 6
66-29
Epitope 4
56-6, 58-4
8-26
70-2
Epitope 1
2-31
5-40
12-34
Epitope 5
80-3
14-23

FIG. 20A

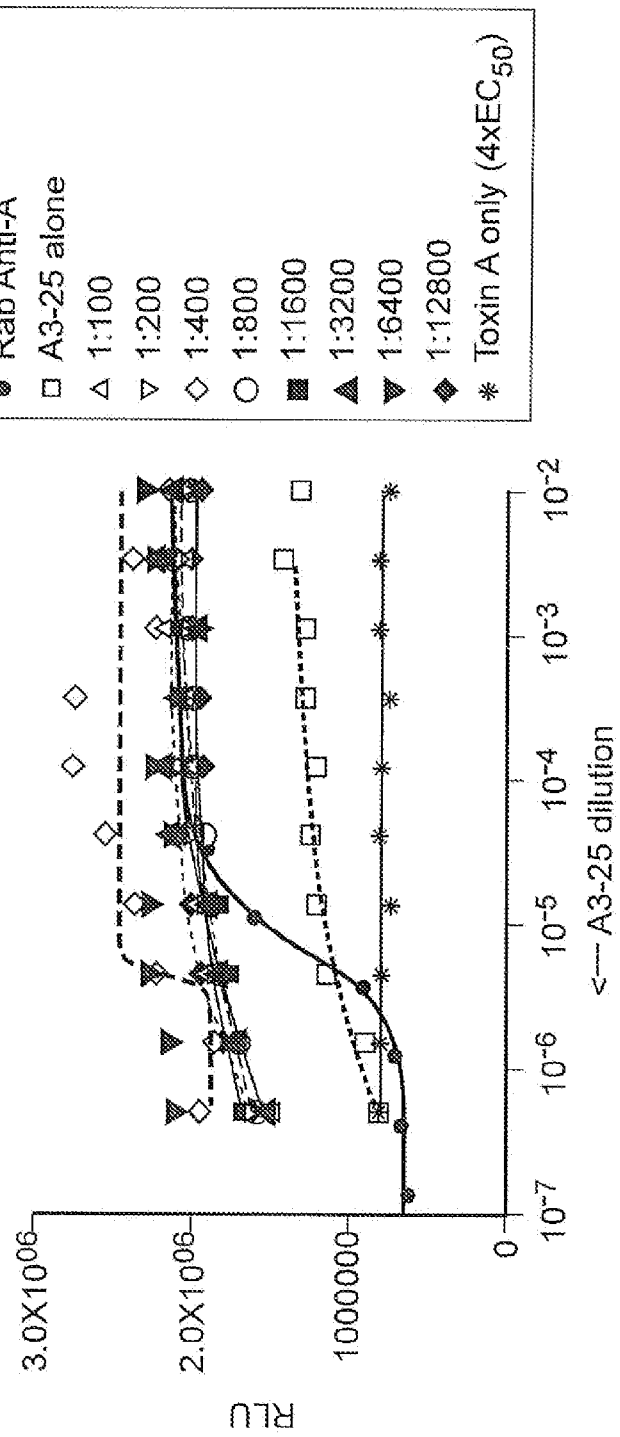

Rab Anti-A
A3-25 alone
1:100
1:200
1:400
1:800
1:1600
1:3200
1:6400
1:12800
Toxin A only (4xEC50)
RLU
3.0X10^06
2.0X10^06
1000000
0
10^-7
10^-6
10^-5
10^-4
10^-3
10^-2
<— A3-25 dilution

FIG. 20B

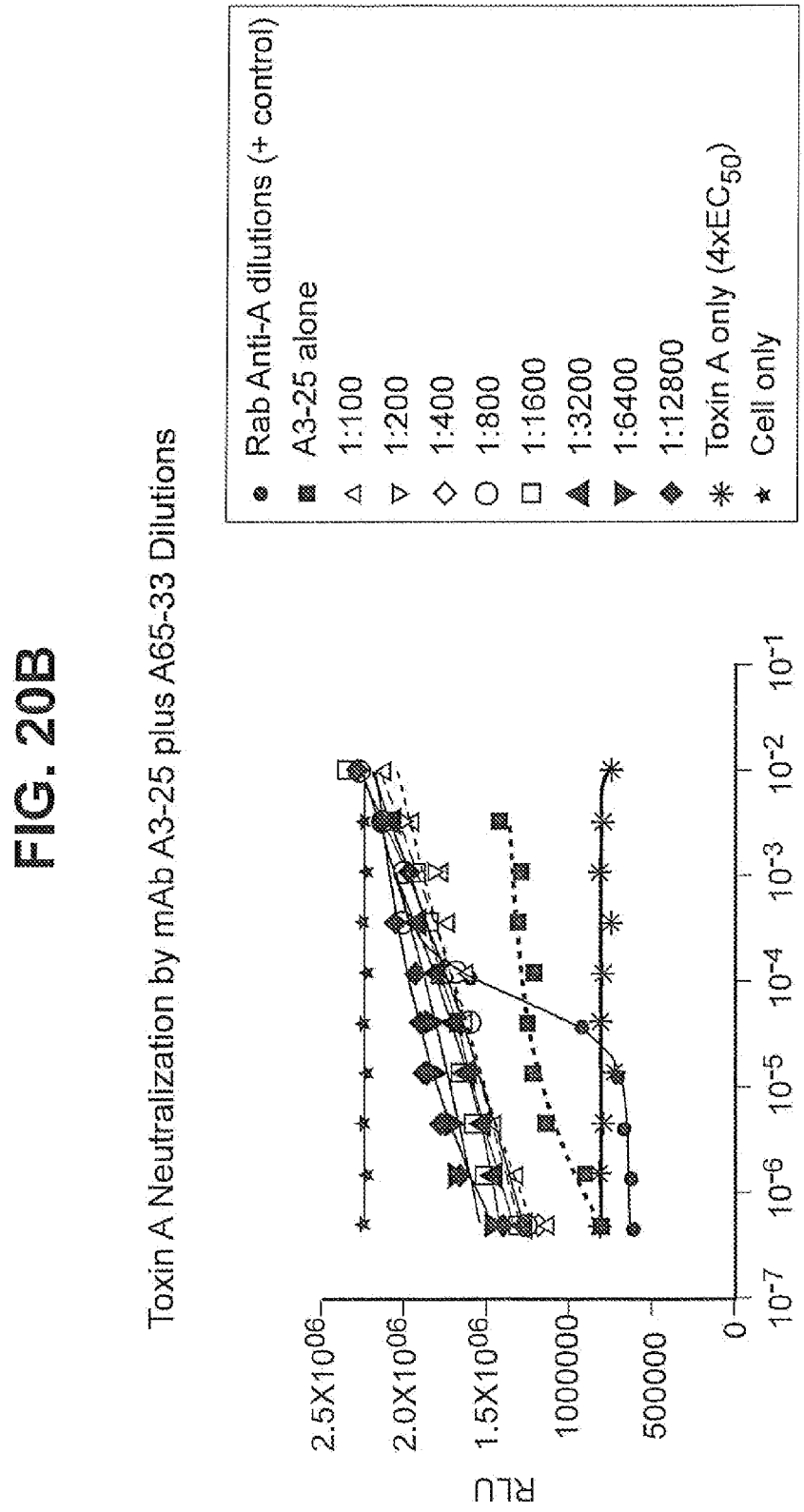

Toxin A Neutralization by mAb A3-25 plus A65-33 Dilutions
Rab Anti-A dilutions (+ control)
A3-25 alone
1:100
1:200
1:400
1:800
1:1600
1:3200
1:6400
1:12800
Toxin A only (4xEC50)
Cell only
RLU
2.5X10^06
2.0X10^06
1.5X10^06
1000000
500000
0
10^-7
10^-6
10^-5
10^-4
10^-3
10^-2
10^-1
<--- A3-25 dilution

FIG. 20C

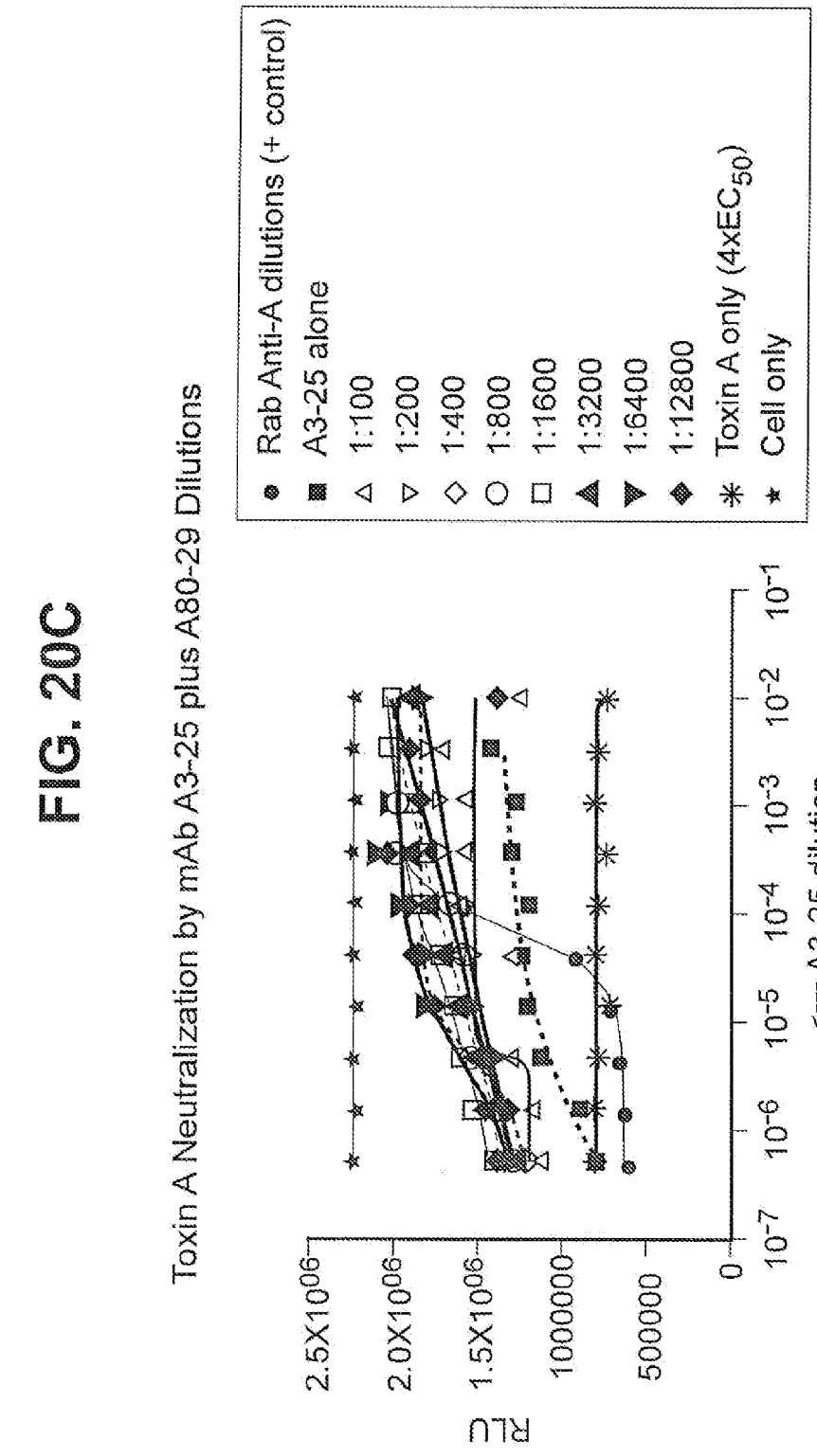

Toxin A Neutralization by mAb A3-25 plus A80-29 Dilutions
Rab Anti-A dilutions (+ control)
A3-25 alone
1:100
1:200
1:400
1:800
1:1600
1:3200
1:6400
1:12800
Toxin A only (4xEC50)
Cell only
RLU
2.5X10^06
2.0X10^06
1.5X10^06
1000000
500000
0
10^-7
10^-6
10^-5
10^-4
10^-3
10^-2
10^-1
<--- A3-25 dilution

FIG. 21A

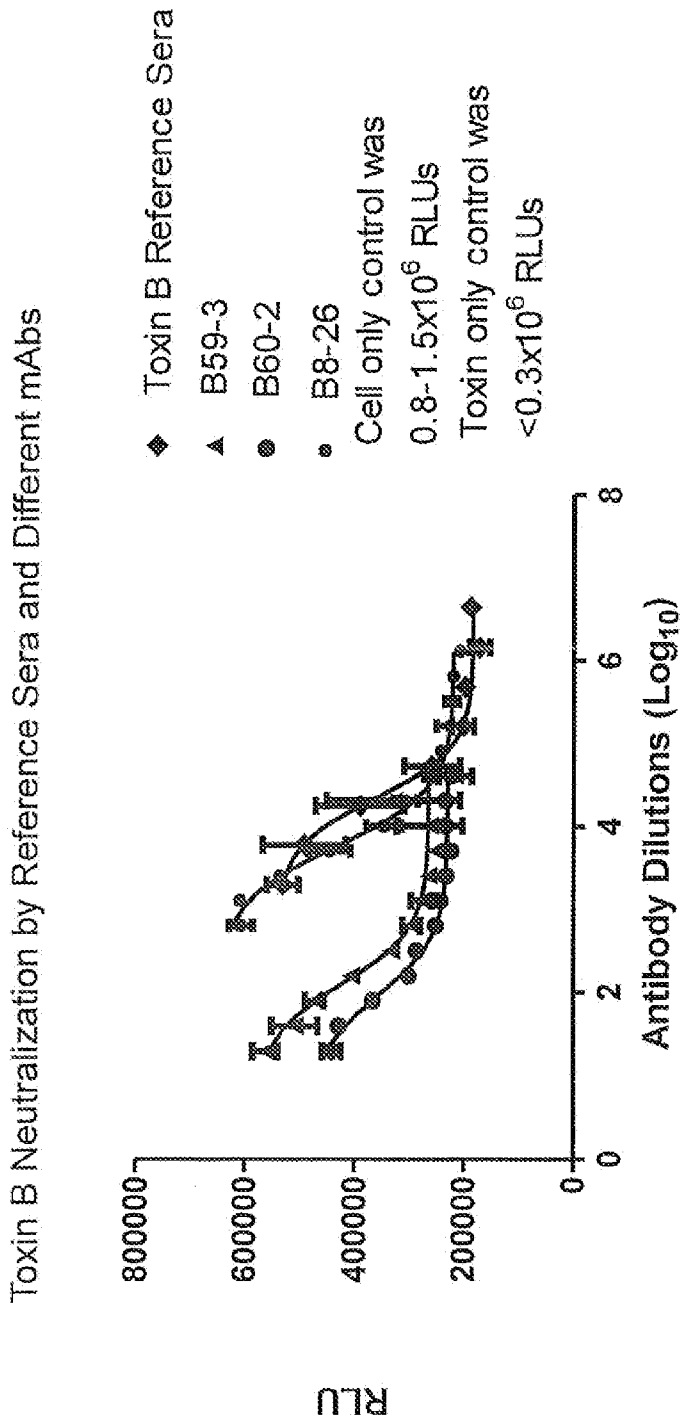

Toxin B Neutralization by Reference Sera and Different mAbs
Toxin B Reference Sera
B59-3
B60-2
B8-26
Cell only control was
0.8-1.5x10^6 RLUs
Toxin only control was
<0.3x10^6 RLUs
RLU
800000
600000
400000
200000
0
0
2
4
6
8
Antibody Dilutions (Log10)

FIG. 21B

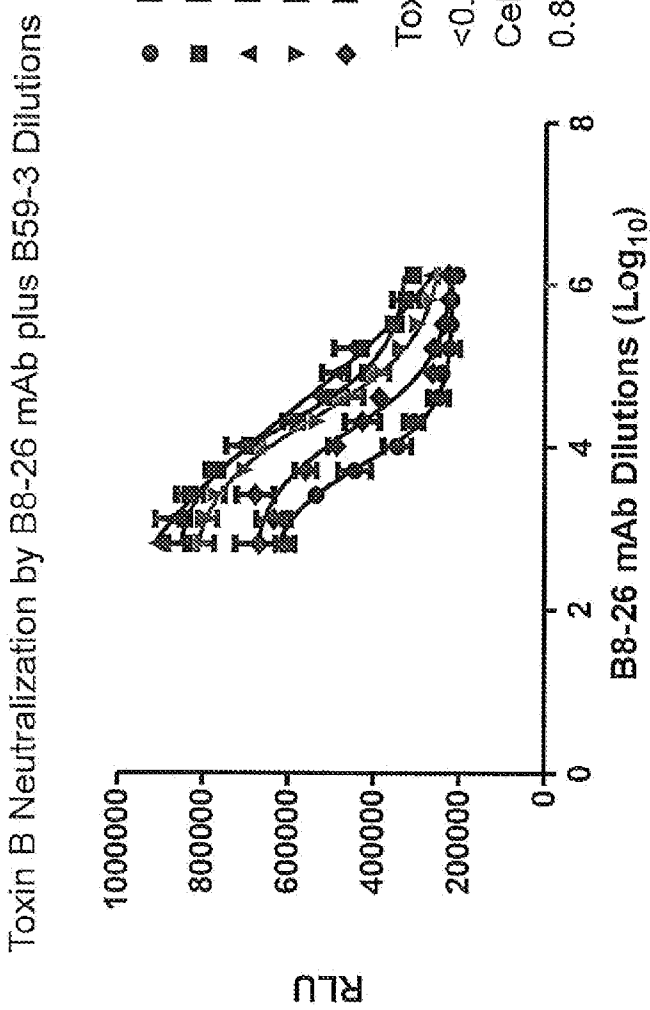

Toxin B Neutralization by B8-26 mAb plus B59-3 Dilutions
B8-26 Alone
B59-3 (1:640)
B59-3 (1:1280)
B59-3 (1:2560)
B59-3 (1:5120)
Toxin B only control was <0.3x10^6 RLUs
Cell only control was 0.8-1.5x10^6 RLUs
RLU
1000000
800000
600000
400000
200000
0
0
2
4
6
8
B8-26 mAb Dilutions (Log10)

FIG. 22

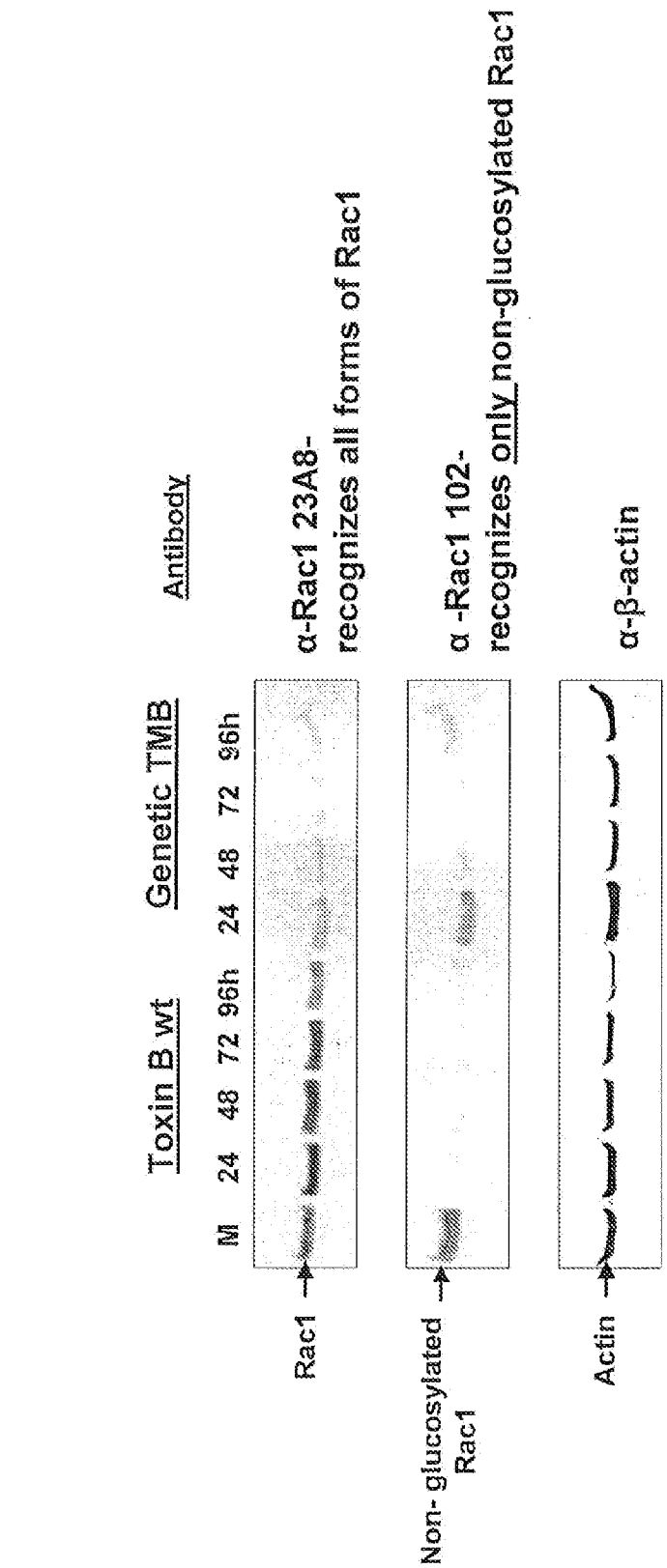
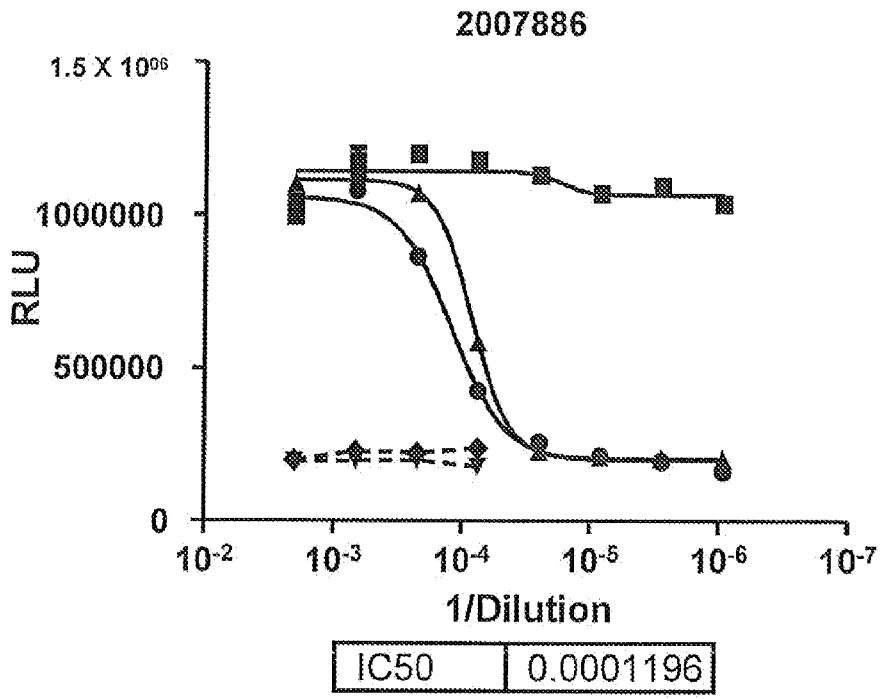

Toxin B wt
Genetic TMB
Antibody
M 24 48 72 96h 24 48 72 96h
α-Rac1 23A8-
recognizes all forms of Rac1
α -Rac1 102-
recognizes only non-glucosylated Rac1
α-β-actin
Rac1
Non- glucosylated
Rac1
Actin

FIG. 23A



IC50	0.0001196

FIG. 23B

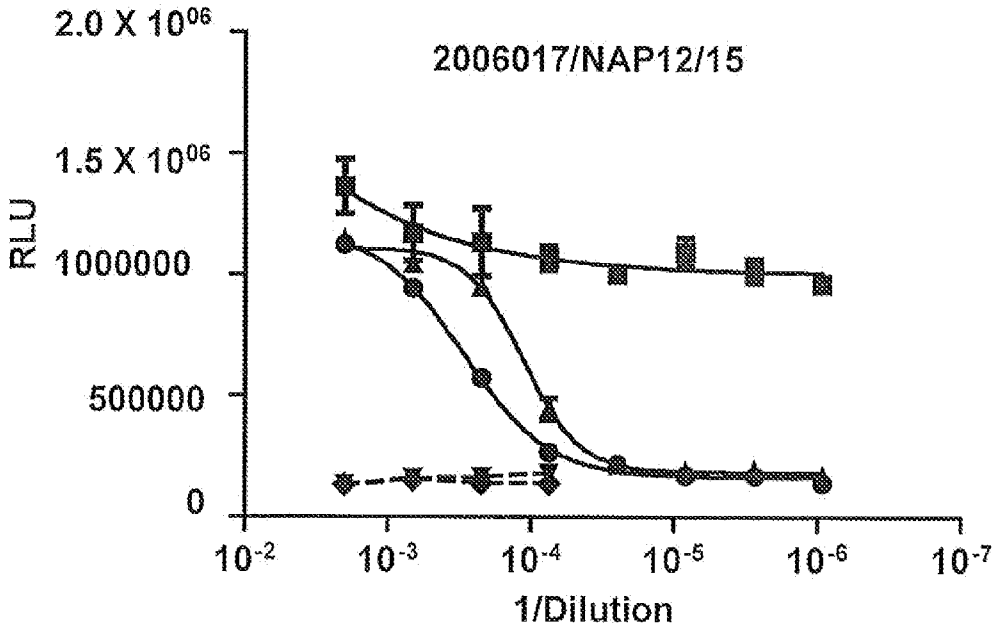


FIG. 23C

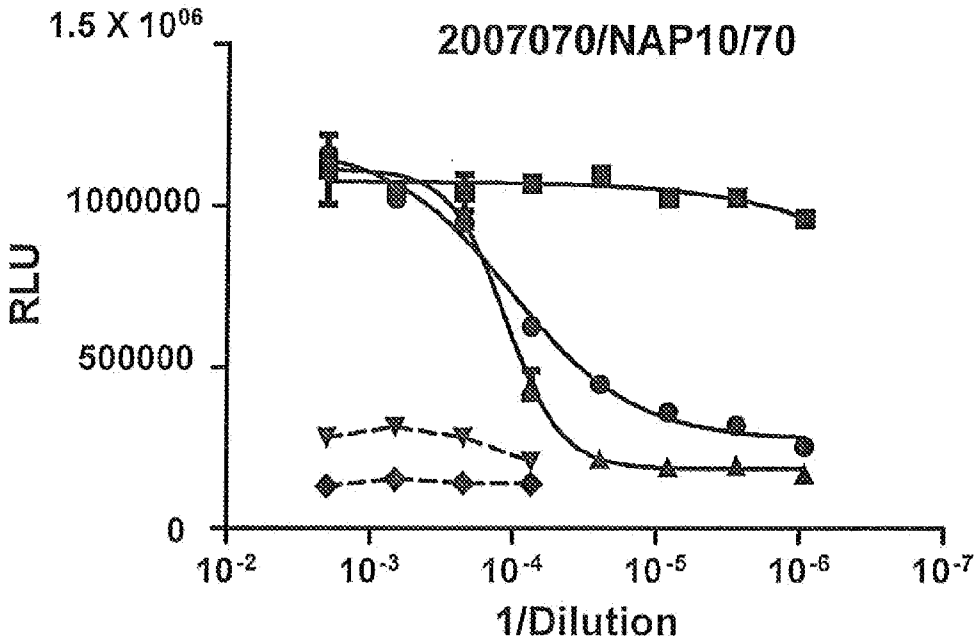


FIG. 23D

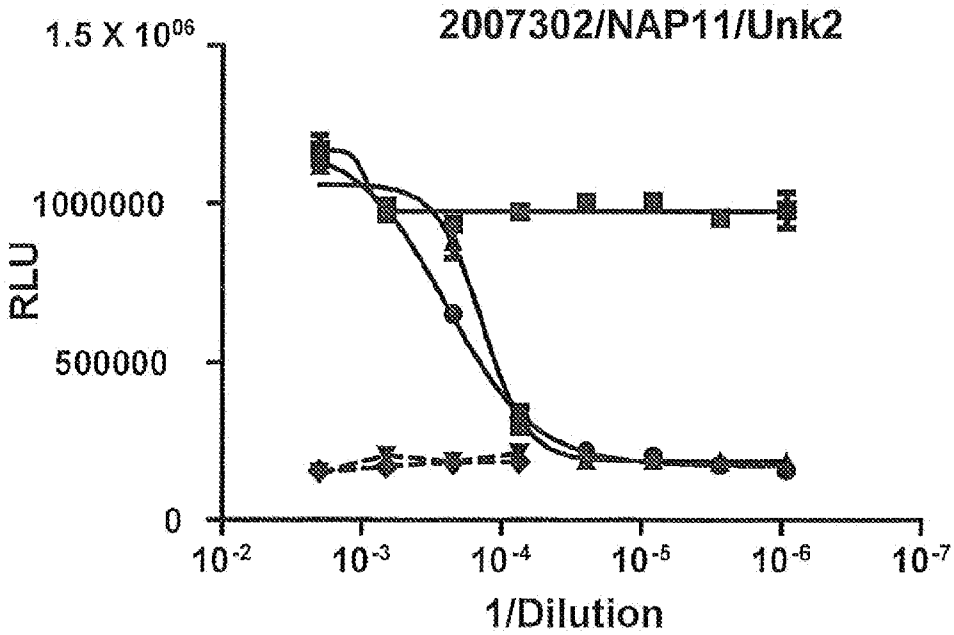


FIG. 23E

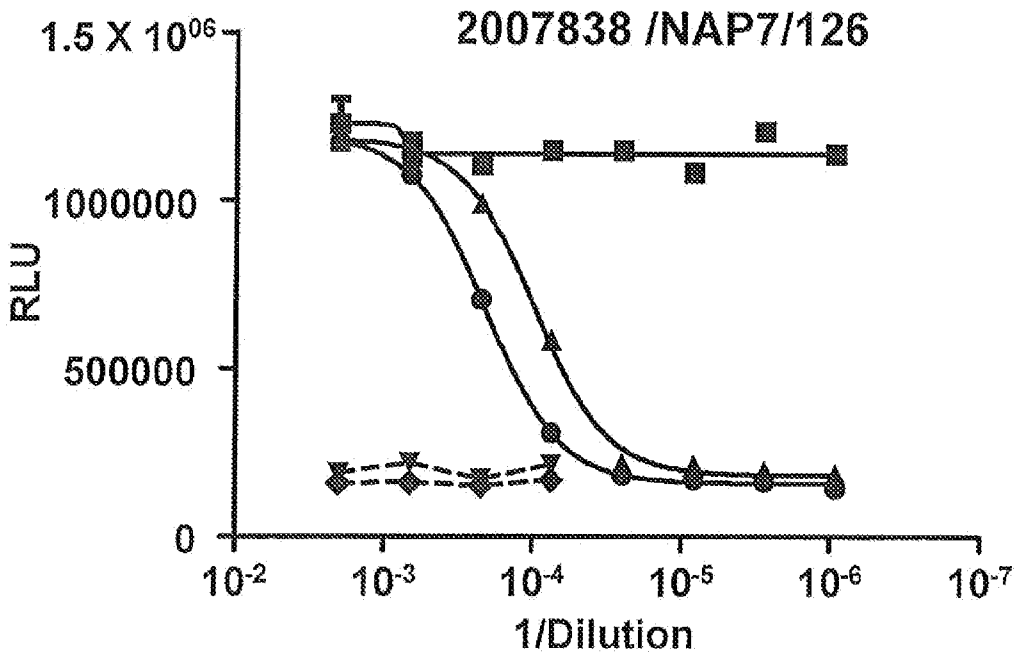


FIG. 23F

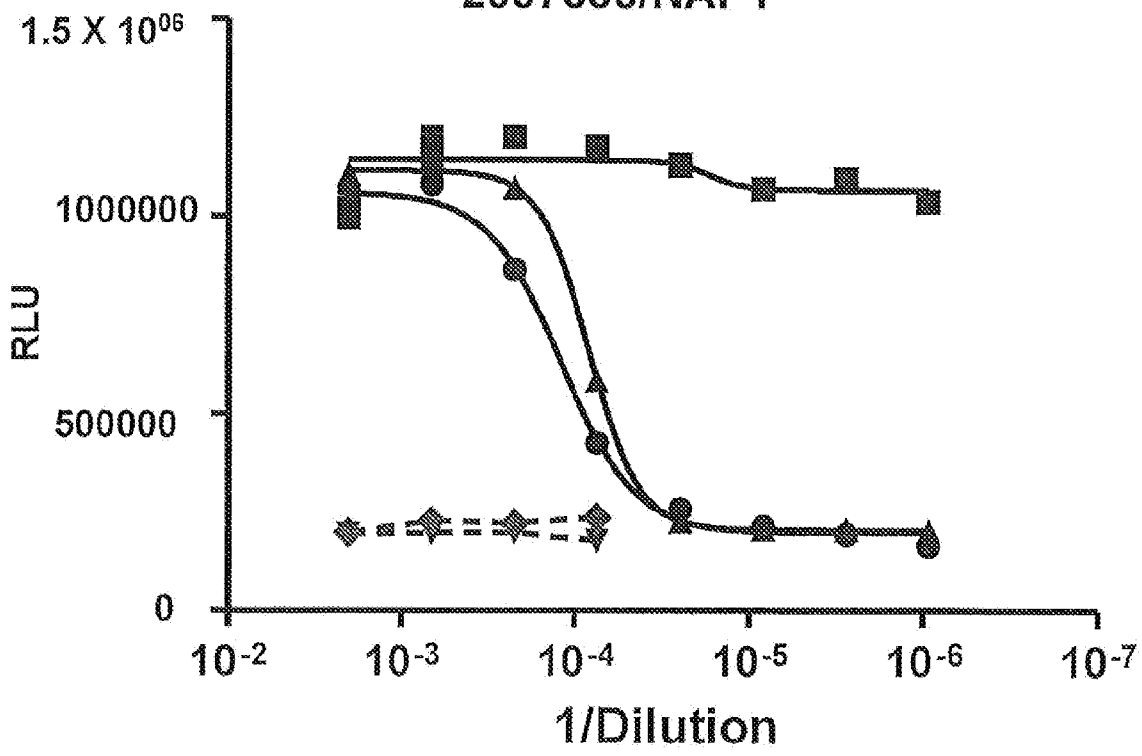


FIG. 23G

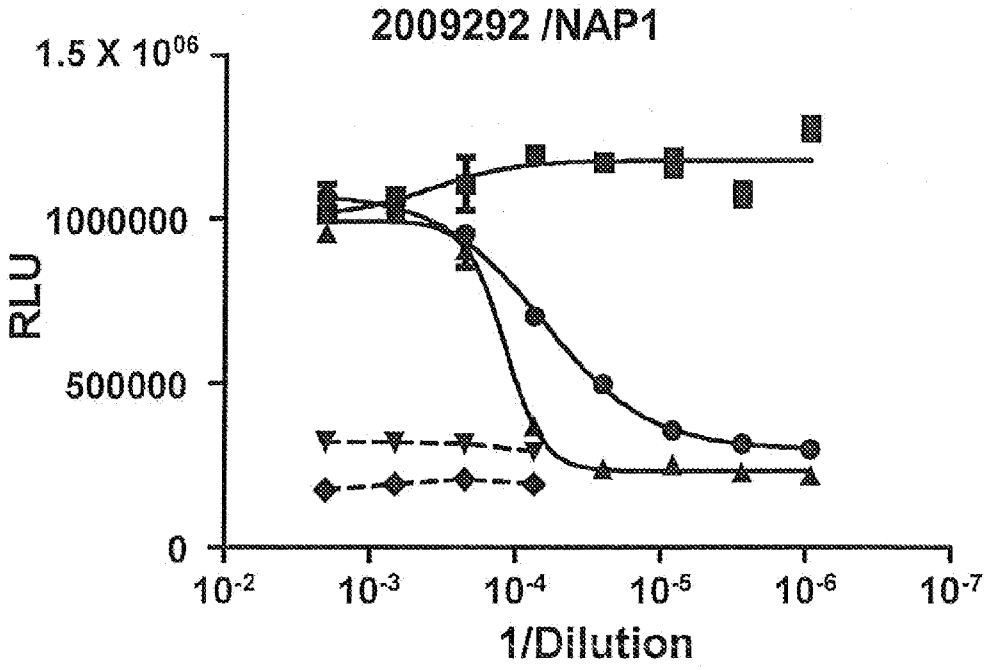


FIG. 23H

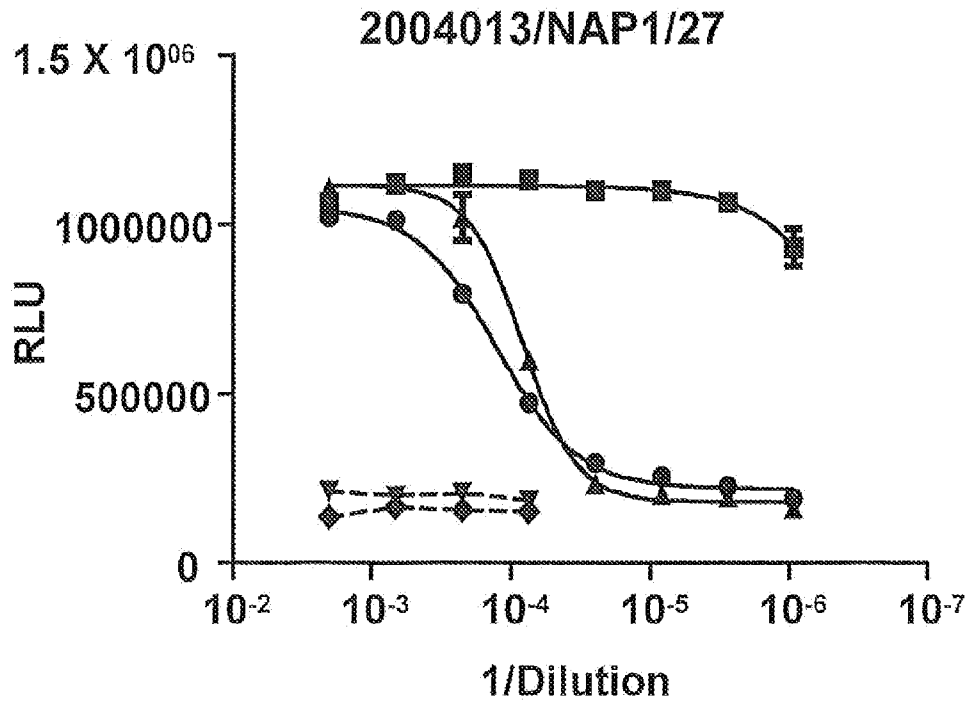


FIG. 23 I

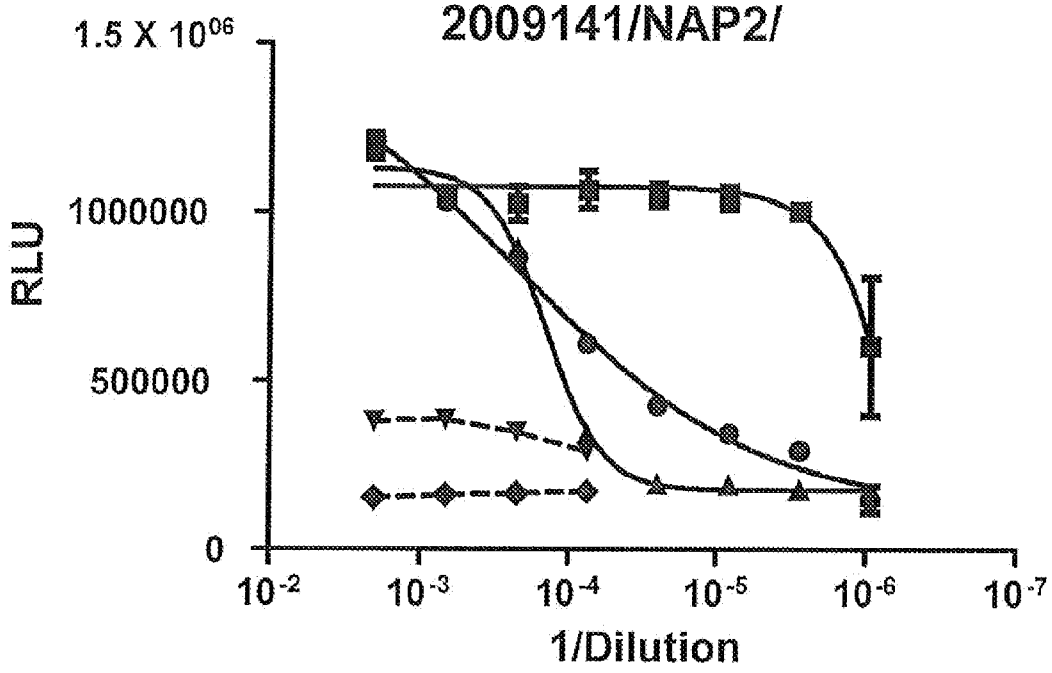


FIG. 23J

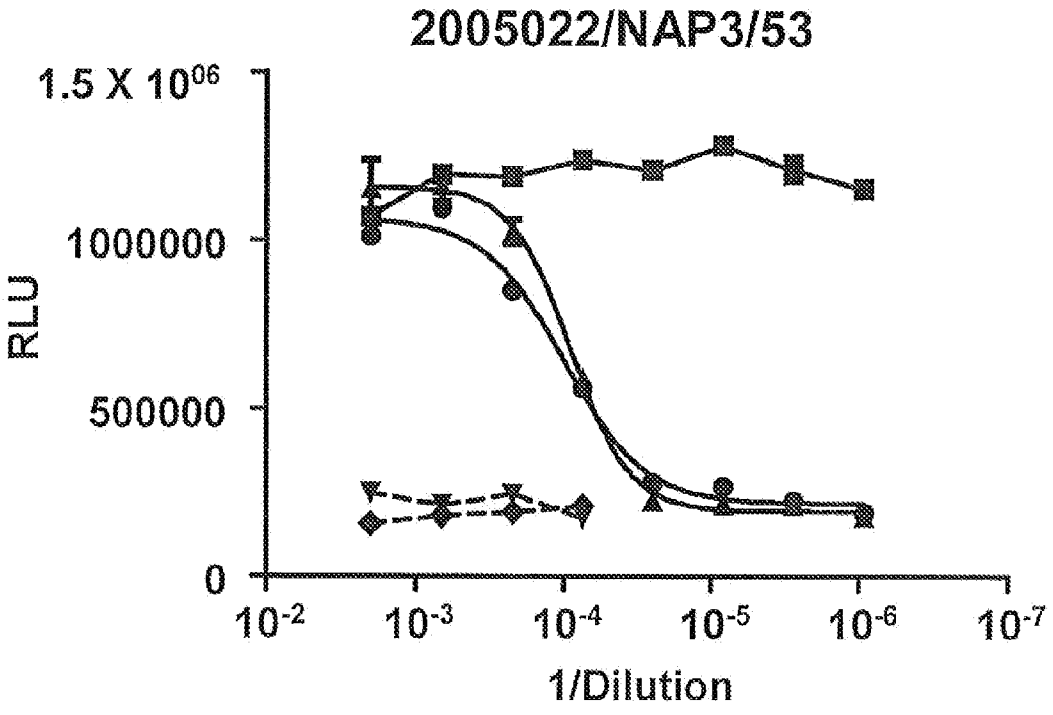
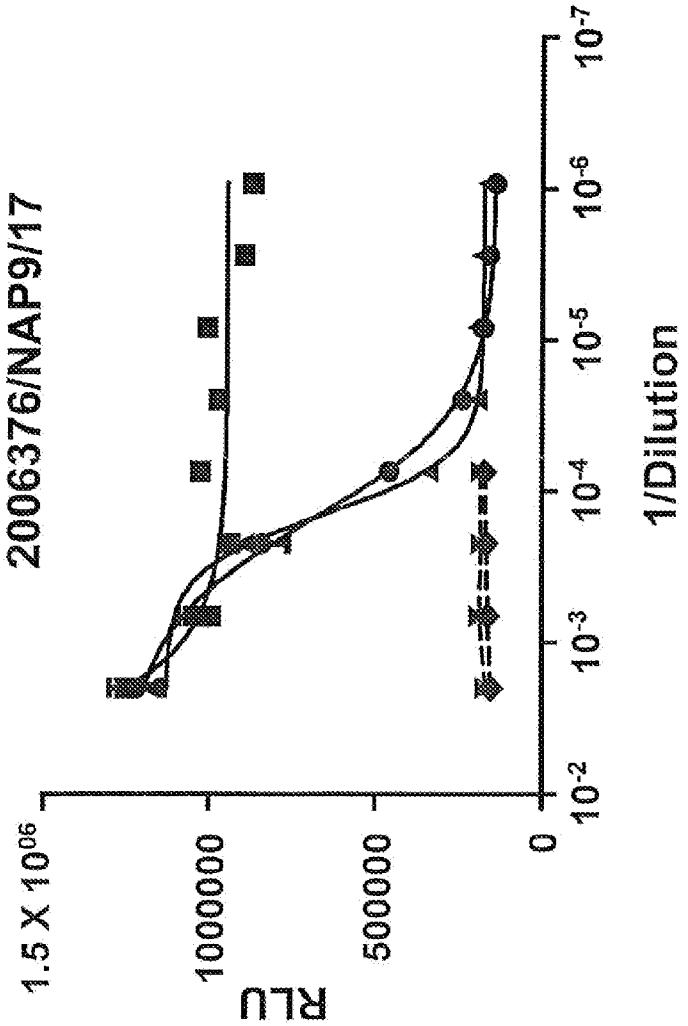


FIG. 23K


2006376/NAP9/17
RLU
1.5 X 10^06
1000000
500000
0
10^-2
10^-3
10^-4
10^-5
10^-6
10^-7
1/Dilution

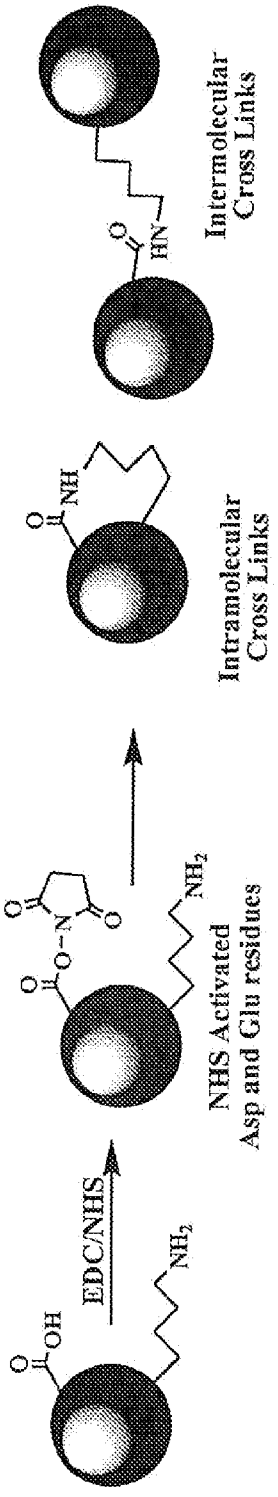


FIG. 24A

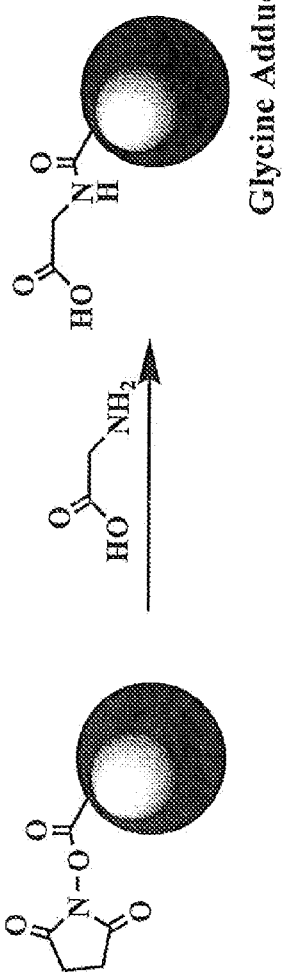


FIG. 24B

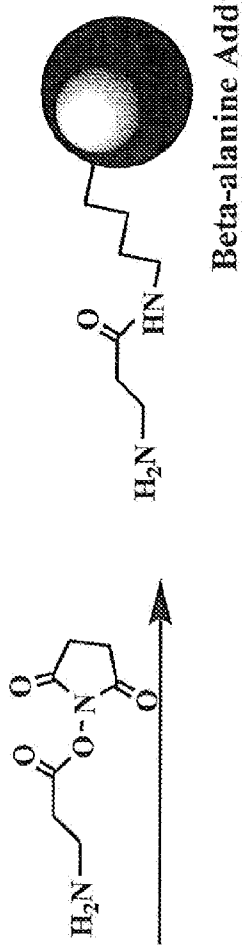


FIG. 24C

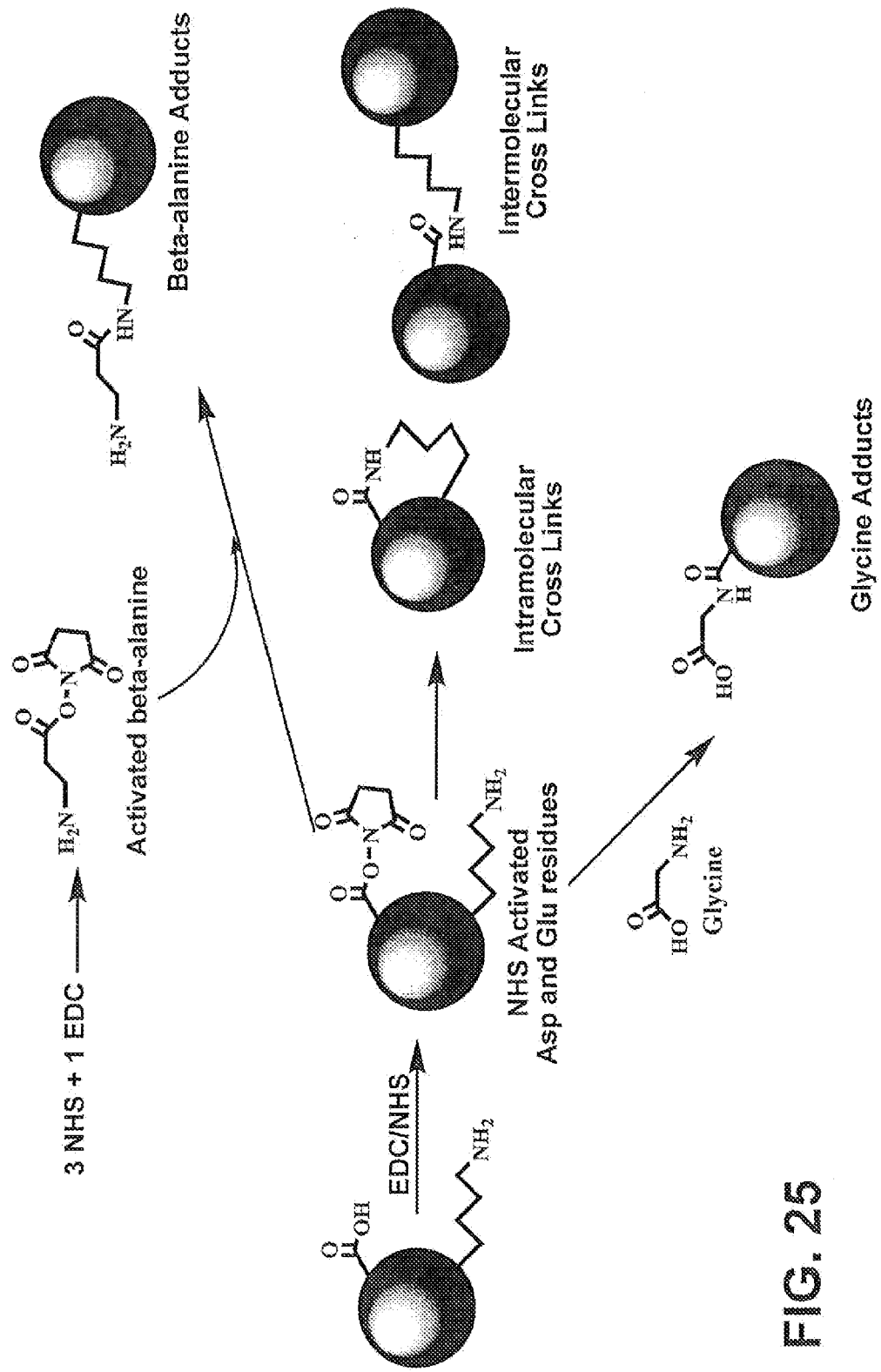

3 NHS + 1 EDC
Activated beta-alanine
Beta-alanine Adducts
EDC/NHS
NHS Activated
Asp and Glu residues
Intramolecular
Cross Links
Intermolecular
Cross Links
Glycine
Glycine Adducts

FIG. 25

FIG. 26

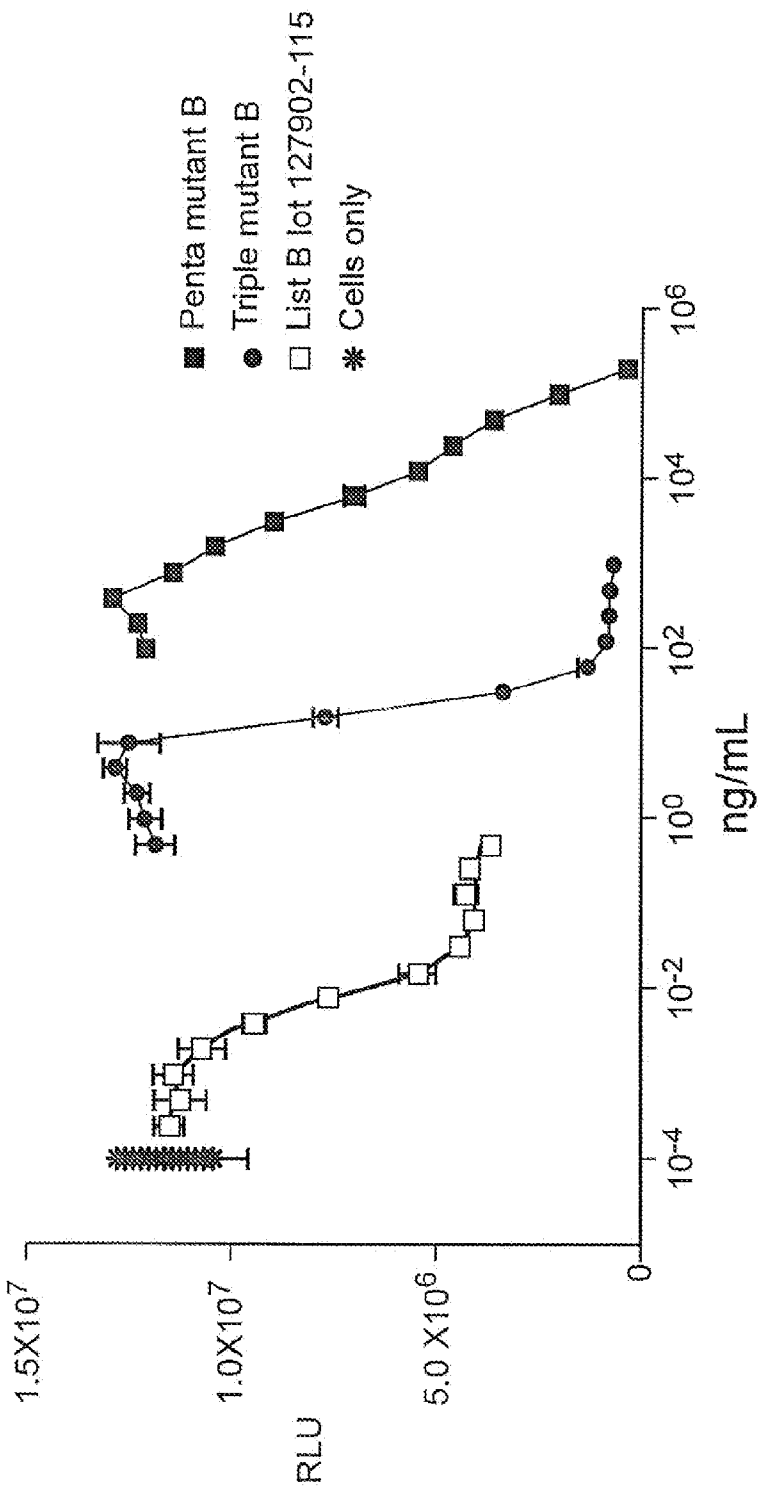

Penta mutant B
Triple mutant B
List B lot 127902-115
Cells only
RLU
1.5X10^7
1.0X10^7
5.0 X10^6
0
10^-4
10^-2
10^0
10^2
10^4
10^6
ng/mL

FIG. 27

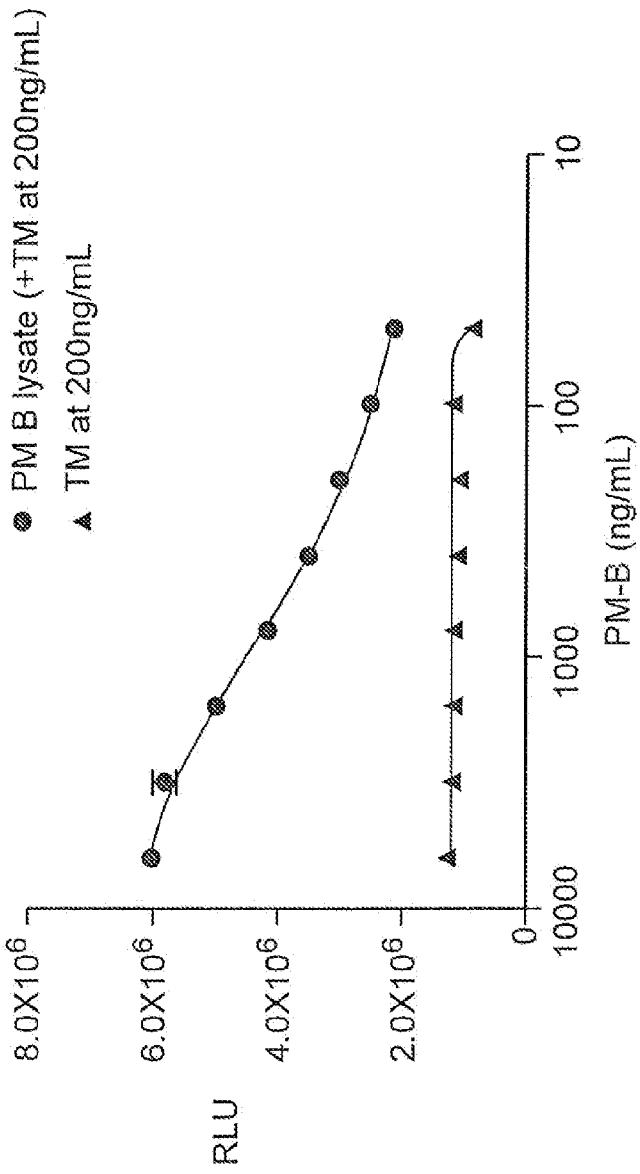

PM B lysate (+TM at 200ng/mL)
TM at 200ng/mL
8.0X10^6
6.0X10^6
4.0X10^6
2.0X10^6
RLU
0
10000
1000
100
10
PM-B (ng/mL)

FIG. 28

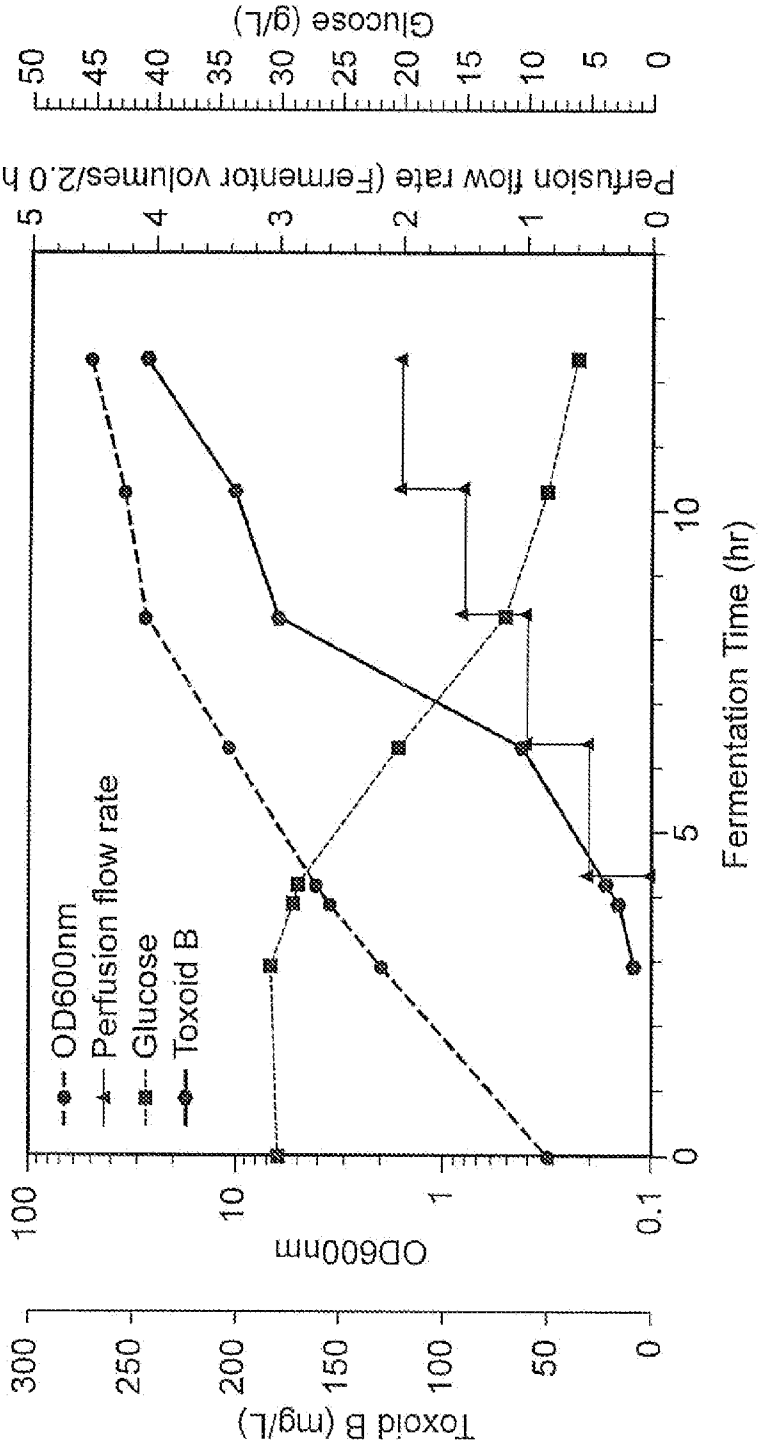
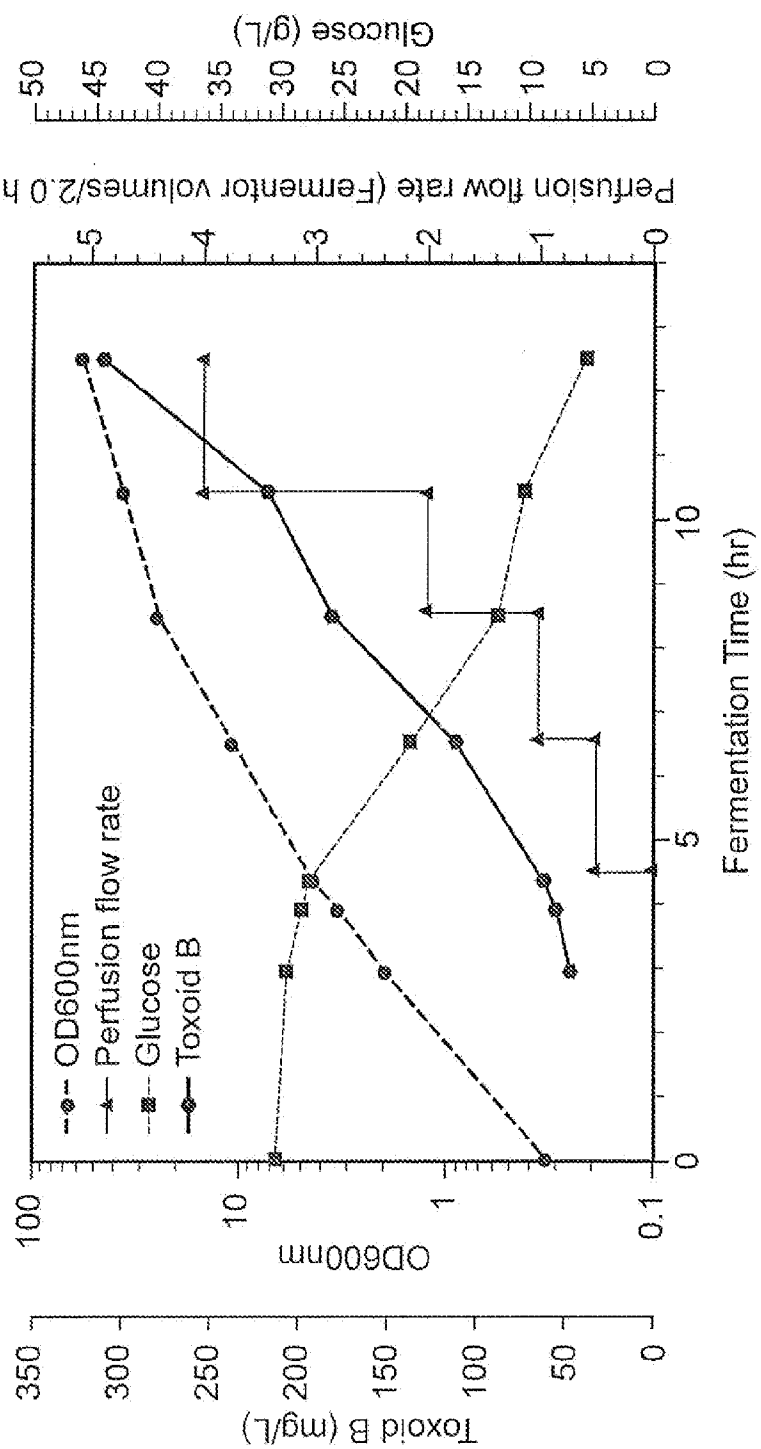

Toxoid B (mg/L)
300
250
200
150
100
50
0
OD600nm
100
10
1
0.1
Perfusion flow rate (Fermentor volumes/2.0 h)
5
4
3
2
1
0
Glucose (g/L)
50
45
40
35
30
25
20
15
10
5
0
Fermentation Time (hr)
0
5
10
OD600nm
Perfusion flow rate
Glucose
Toxoid B

FIG. 29


Glucose (g/L)
0
5
10
15
20
25
30
35
40
45
50
Perfusion flow rate (Fermentor volumes/2.0 h)
0
1
2
3
4
5
Fermentation Time (hr)
0
5
10
OD600nm
0.1
1
10
100
Toxoid B (mg/L)
0
50
100
150
200
250
300
350
OD600nm
Perfusion flow rate
Glucose
Toxoid B

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SEQUENCE LISTING

<110> PFIZER INC.
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<120> COMPOSITIONS AND METHODS RELATING TO A MUTANT CLOSTRIDIUM DIFFICILE TOXIN

<130> PC071976

<150> 61/716605
<151> 2012-10-21

<160> 761

<170> PatentIn version 3.5

<210> 1
<211> 2709
<212> PRT
<213> Clostridium difficile

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Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

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```
Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met Leu
        275                 280                 285
```

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```
Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495
```

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```
Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
    530                 535                 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545                 550                 555                 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
        595                 600                 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
    610                 615                 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625                 630                 635                 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
                645                 650                 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
            660                 665                 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
        675                 680                 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr
    690                 695                 700
```

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```
Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705                 710                 715                 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
                725                 730                 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
            740                 745                 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
        755                 760                 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
    770                 775                 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785                 790                 795                 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
                805                 810                 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
            820                 825                 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
        835                 840                 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
    850                 855                 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865                 870                 875                 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
                885                 890                 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
            900                 905                 910
```

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```
Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
        915                 920                 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
    930                 935                 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945                 950                 955                 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
                965                 970                 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
            980                 985                 990

Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Tyr Asp Ser  Ile Gln Leu
        995                 1000                1005

Val Asn  Leu Ile Ser Asn Ala  Val Asn Asp Thr Ile  Asn Val Leu
    1010                1015                1020

Pro Thr  Ile Thr Glu Gly Ile  Pro Ile Val Ser Thr  Ile Leu Asp
    1025                1030                1035

Gly Ile  Asn Leu Gly Ala Ala  Ile Lys Glu Leu Leu  Asp Glu His
    1040                1045                1050

Asp Pro  Leu Leu Lys Lys Glu  Leu Glu Ala Lys Val  Gly Val Leu
    1055                1060                1065

Ala Ile  Asn Met Ser Leu Ser  Ile Ala Ala Thr Val  Ala Ser Ile
    1070                1075                1080

Val Gly  Ile Gly Ala Glu Val  Thr Ile Phe Leu Leu  Pro Ile Ala
    1085                1090                1095

Gly Ile  Ser Ala Gly Ile Pro  Ser Leu Val Asn Asn  Glu Leu Ile
    1100                1105                1110
```

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Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu
1115 1120 1125

Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys
1130 1135 1140

Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly
1235 1240 1245

Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

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Arg Asn  Lys Leu Ser Tyr Ser  Phe Asp Gly Ala Gly  Gly Thr Tyr
    1310                1315                1320

Ser Leu  Leu Leu Ser Ser Tyr  Pro Ile Ser Thr Asn  Ile Asn Leu
    1325                1330                1335

Ser Lys  Asp Asp Leu Trp Ile  Phe Asn Ile Asp Asn  Glu Val Arg
    1340                1345                1350

Glu Ile  Ser Ile Glu Asn Gly  Thr Ile Lys Lys Gly  Lys Leu Ile
    1355                1360                1365

Lys Asp  Val Leu Ser Lys Ile  Asp Ile Asn Lys Asn  Lys Leu Ile
    1370                1375                1380

Ile Gly  Asn Gln Thr Ile Asp  Phe Ser Gly Asp Ile  Asp Asn Lys
    1385                1390                1395

Asp Arg  Tyr Ile Phe Leu Thr  Cys Glu Leu Asp Asp  Lys Ile Ser
    1400                1405                1410

Leu Ile  Ile Glu Ile Asn Leu  Val Ala Lys Ser Tyr  Ser Leu Leu
    1415                1420                1425

Leu Ser  Gly Asp Lys Asn Tyr  Leu Ile Ser Asn Leu  Ser Asn Ile
    1430                1435                1440

Ile Glu  Lys Ile Asn Thr Leu  Gly Leu Asp Ser Lys  Asn Ile Ala
    1445                1450                1455

Tyr Asn  Tyr Thr Asp Glu Ser  Asn Asn Lys Tyr Phe  Gly Ala Ile
    1460                1465                1470

Ser Lys  Thr Ser Gln Lys Ser  Ile Ile His Tyr Lys  Lys Asp Ser
    1475                1480                1485

Lys Asn  Ile Leu Glu Phe Tyr  Asn Asp Ser Thr Leu  Glu Phe Asn
    1490                1495                1500
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```
Ser Lys  Asp Phe Ile Ala Glu  Asp Ile Asn Val Phe  Met Lys Asp
    1505                 1510                 1515

Asp Ile  Asn Thr Ile Thr Gly  Lys Tyr Tyr Val Asp  Asn Asn Thr
    1520                 1525                 1530

Asp Lys  Ser Ile Asp Phe Ser  Ile Ser Leu Val Ser  Lys Asn Gln
    1535                 1540                 1545

Val Lys  Val Asn Gly Leu Tyr  Leu Asn Glu Ser Val  Tyr Ser Ser
    1550                 1555                 1560

Tyr Leu  Asp Phe Val Lys Asn  Ser Asp Gly His His  Asn Thr Ser
    1565                 1570                 1575

Asn Phe  Met Asn Leu Phe Leu  Asp Asn Ile Ser Phe  Trp Lys Leu
    1580                 1585                 1590

Phe Gly  Phe Glu Asn Ile Asn  Phe Val Ile Asp Lys  Tyr Phe Thr
    1595                 1600                 1605

Leu Val  Gly Lys Thr Asn Leu  Gly Tyr Val Glu Phe  Ile Cys Asp
    1610                 1615                 1620

Asn Asn  Lys Asn Ile Asp Ile  Tyr Phe Gly Glu Trp  Lys Thr Ser
    1625                 1630                 1635

Ser Ser  Lys Ser Thr Ile Phe  Ser Gly Asn Gly Arg  Asn Val Val
    1640                 1645                 1650

Val Glu  Pro Ile Tyr Asn Pro  Asp Thr Gly Glu Asp  Ile Ser Thr
    1655                 1660                 1665

Ser Leu  Asp Phe Ser Tyr Glu  Pro Leu Tyr Gly Ile  Asp Arg Tyr
    1670                 1675                 1680

Ile Asn  Lys Val Leu Ile Ala  Pro Asp Leu Tyr Thr  Ser Leu Ile
    1685                 1690                 1695
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```
Asn Ile  Asn Thr Asn Tyr Tyr  Ser Asn Glu Tyr Tyr  Pro Glu Ile
    1700                1705                1710

Ile Val  Leu Asn Pro Asn Thr  Phe His Lys Lys Val  Asn Ile Asn
    1715                1720                1725

Leu Asp  Ser Ser Ser Phe Glu  Tyr Lys Trp Ser Thr  Glu Gly Ser
    1730                1735                1740

Asp Phe  Ile Leu Val Arg Tyr  Leu Glu Glu Ser Asn  Lys Lys Ile
    1745                1750                1755

Leu Gln  Lys Ile Arg Ile Lys  Gly Ile Leu Ser Asn  Thr Gln Ser
    1760                1765                1770

Phe Asn  Lys Met Ser Ile Asp  Phe Lys Asp Ile Lys  Lys Leu Ser
    1775                1780                1785

Leu Gly  Tyr Ile Met Ser Asn  Phe Lys Ser Phe Asn  Ser Glu Asn
    1790                1795                1800

Glu Leu  Asp Arg Asp His Leu  Gly Phe Lys Ile Ile  Asp Asn Lys
    1805                1810                1815

Thr Tyr  Tyr Tyr Asp Glu Asp  Ser Lys Leu Val Lys  Gly Leu Ile
    1820                1825                1830

Asn Ile  Asn Asn Ser Leu Phe  Tyr Phe Asp Pro Ile  Glu Phe Asn
    1835                1840                1845

Leu Val  Thr Gly Trp Gln Thr  Ile Asn Gly Lys Lys  Tyr Tyr Phe
    1850                1855                1860

Asp Ile  Asn Thr Gly Ala Ala  Leu Ile Ser Tyr Lys  Ile Ile Asn
    1865                1870                1875

Gly Lys  His Phe Tyr Phe Asn  Asn Asp Gly Val Met  Gln Leu Gly
    1880                1885                1890
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```
Val Phe  Lys Gly Pro Asp Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    1895                1900                1905

Thr Gln  Asn Asn Asn Ile Glu  Gly Gln Ala Ile Val  Tyr Gln Ser
    1910                1915                1920

Lys Phe  Leu Thr Leu Asn Gly  Lys Lys Tyr Tyr Phe  Asp Asn Asp
    1925                1930                1935

Ser Lys  Ala Val Thr Gly Trp  Arg Ile Ile Asn Asn  Glu Lys Tyr
    1940                1945                1950

Tyr Phe  Asn Pro Asn Asn Ala  Ile Ala Ala Val Gly  Leu Gln Val
    1955                1960                1965

Ile Asp  Asn Asn Lys Tyr Tyr  Phe Asn Pro Asp Thr  Ala Ile Ile
    1970                1975                1980

Ser Lys  Gly Trp Gln Thr Val  Asn Gly Ser Arg Tyr  Tyr Phe Asp
    1985                1990                1995

Thr Asp  Thr Ala Ile Ala Phe  Asn Gly Tyr Lys Thr  Ile Asp Gly
    2000                2005                2010

Lys His  Phe Tyr Phe Asp Ser  Asp Cys Val Val Lys  Ile Gly Val
    2015                2020                2025

Phe Ser  Thr Ser Asn Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr
    2030                2035                2040

Tyr Asn  Asn Asn Ile Glu Gly  Gln Ala Ile Val Tyr  Gln Ser Lys
    2045                2050                2055

Phe Leu  Thr Leu Asn Gly Lys  Lys Tyr Tyr Phe Asp  Asn Asn Ser
    2060                2065                2070

Lys Ala  Val Thr Gly Trp Gln  Thr Ile Asp Ser Lys  Lys Tyr Tyr
    2075                2080                2085
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```
Phe Asn  Thr Asn Thr Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile
    2090                2095                2100

Asp Gly  Lys Lys Tyr Tyr Phe  Asn Thr Asn Thr Ala  Glu Ala Ala
    2105                2110                2115

Thr Gly  Trp Gln Thr Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr
    2120                2125                2130

Asn Thr  Ala Ile Ala Ser Thr  Gly Tyr Thr Ile Ile  Asn Gly Lys
    2135                2140                2145

His Phe  Tyr Phe Asn Thr Asp  Gly Ile Met Gln Ile  Gly Val Phe
    2150                2155                2160

Lys Gly  Pro Asn Gly Phe Glu  Tyr Phe Ala Pro Ala  Asn Thr Asp
    2165                2170                2175

Ala Asn  Asn Ile Glu Gly Gln  Ala Ile Leu Tyr Gln  Asn Glu Phe
    2180                2185                2190

Leu Thr  Leu Asn Gly Lys Lys  Tyr Tyr Phe Gly Ser  Asp Ser Lys
    2195                2200                2205

Ala Val  Thr Gly Trp Arg Ile  Ile Asn Asn Lys Lys  Tyr Tyr Phe
    2210                2215                2220

Asn Pro  Asn Asn Ala Ile Ala  Ala Ile His Leu Cys  Thr Ile Asn
    2225                2230                2235

Asn Asp  Lys Tyr Tyr Phe Ser  Tyr Asp Gly Ile Leu  Gln Asn Gly
    2240                2245                2250

Tyr Ile  Thr Ile Glu Arg Asn  Asn Phe Tyr Phe Asp  Ala Asn Asn
    2255                2260                2265

Glu Ser  Lys Met Val Thr Gly  Val Phe Lys Gly Pro  Asn Gly Phe
    2270                2275                2280
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Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
2330 2335 2340

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

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```
Val Thr  Gly Trp Gln Thr Ile  Asn Gly Lys Lys Tyr  Tyr Phe Asn
    2480                 2485                 2490

Thr Asn  Thr Ser Ile Ala Ser  Thr Gly Tyr Thr Ile  Ile Ser Gly
    2495                 2500                 2505

Lys His  Phe Tyr Phe Asn Thr  Asp Gly Ile Met Gln  Ile Gly Val
    2510                 2515                 2520

Phe Lys  Gly Pro Asp Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr
    2525                 2530                 2535

Asp Ala  Asn Asn Ile Glu Gly  Gln Ala Ile Arg Tyr  Gln Asn Arg
    2540                 2545                 2550

Phe Leu  Tyr Leu His Asp Asn  Ile Tyr Tyr Phe Gly  Asn Asn Ser
    2555                 2560                 2565

Lys Ala  Ala Thr Gly Trp Val  Thr Ile Asp Gly Asn  Arg Tyr Tyr
    2570                 2575                 2580

Phe Glu  Pro Asn Thr Ala Met  Gly Ala Asn Gly Tyr  Lys Thr Ile
    2585                 2590                 2595

Asp Asn  Lys Asn Phe Tyr Phe  Arg Asn Gly Leu Pro  Gln Ile Gly
    2600                 2605                 2610

Val Phe  Lys Gly Ser Asn Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2615                 2620                 2625

Thr Asp  Ala Asn Asn Ile Glu  Gly Gln Ala Ile Arg  Tyr Gln Asn
    2630                 2635                 2640

Arg Phe  Leu His Leu Leu Gly  Lys Ile Tyr Tyr Phe  Gly Asn Asn
    2645                 2650                 2655

Ser Lys  Ala Val Thr Gly Trp  Gln Thr Ile Asn Gly  Lys Val Tyr
    2660                 2665                 2670
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Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

<210> 2
<211> 2366
<212> PRT
<213> Clostridium difficile

<400> 2

Met Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg
1 5 10 15

Phe Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
20 25 30

Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
35 40 45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
50 55 60

Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65 70 75 80

Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys
85 90 95

Asn Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
100 105 110

Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
115 120 125

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```
Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
    130                 135                 140

Val Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145                 150                 155                 160

Leu Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met
                165                 170                 175

Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala
            180                 185                 190

Gln Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr
        195                 200                 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr
    210                 215                 220

Ile Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val
225                 230                 235                 240

Arg Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu
                245                 250                 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu
            260                 265                 270

Arg Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp
        275                 280                 285

Met Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro
    290                 295                 300

Ser Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile
305                 310                 315                 320

Met Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp
                325                 330                 335
```

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```
Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
            340                 345                 350

Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala
        355                 360                 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn
    370                 375                 380

Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val
385                 390                 395                 400

Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro
                405                 410                 415

Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile
            420                 425                 430

Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met
        435                 440                 445

Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr
    450                 455                 460

Thr Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp
465                 470                 475                 480

Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala
                485                 490                 495

Asp Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr
            500                 505                 510

Glu Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys
        515                 520                 525

Ala Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly
    530                 535                 540
```

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```
Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu
545                 550                 555                 560

Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly
                565                 570                 575

Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
            580                 585                 590

Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe
        595                 600                 605

Gln Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly
    610                 615                 620

Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile
625                 630                 635                 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp
                645                 650                 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser
            660                 665                 670

Thr Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro
        675                 680                 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser
    690                 695                 700

Ile Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys
705                 710                 715                 720

Asp Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
                725                 730                 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg
            740                 745                 750
```

```
Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
        755                 760                 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
    770                 775                 780

Asn Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785                 790                 795                 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu
                805                 810                 815

Glu Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
            820                 825                 830

Asp Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr
        835                 840                 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser
    850                 855                 860

Ile Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp
865                 870                 875                 880

Ser His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe
                885                 890                 895

Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
            900                 905                 910

Thr Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu
        915                 920                 925

Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
    930                 935                 940

Val Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn
945                 950                 955                 960
```

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```
Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu
                965                 970                 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
            980                 985                 990

Leu Phe Ser Thr Gly Leu Asn Thr  Ile Thr Asp Ala Ala  Lys Val Val
        995                 1000                1005

Glu Leu  Val Ser Thr Ala Leu  Asp Glu Thr Ile Asp  Leu Leu Pro
    1010                1015                1020

Thr Leu  Ser Glu Gly Leu Pro  Ile Ile Ala Thr Ile  Ile Asp Gly
    1025                1030                1035

Val Ser  Leu Gly Ala Ala Ile  Lys Glu Leu Ser Glu  Thr Ser Asp
    1040                1045                1050

Pro Leu  Leu Arg Gln Glu Ile  Glu Ala Lys Ile Gly  Ile Met Ala
    1055                1060                1065

Val Asn  Leu Thr Thr Ala Thr  Thr Ala Ile Ile Thr  Ser Ser Leu
    1070                1075                1080

Gly Ile  Ala Ser Gly Phe Ser  Ile Leu Leu Val Pro  Leu Ala Gly
    1085                1090                1095

Ile Ser  Ala Gly Ile Pro Ser  Leu Val Asn Asn Glu  Leu Val Leu
    1100                1105                1110

Arg Asp  Lys Ala Thr Lys Val  Val Asp Tyr Phe Lys  His Val Ser
    1115                1120                1125

Leu Val  Glu Thr Glu Gly Val  Phe Thr Leu Leu Asp  Asp Lys Ile
    1130                1135                1140

Met Met  Pro Gln Asp Asp Leu  Val Ile Ser Glu Ile  Asp Phe Asn
    1145                1150                1155
```

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```
Asn Asn  Ser Ile Val Leu Gly  Lys Cys Glu Ile Trp  Arg Met Glu
    1160                1165                1170

Gly Gly  Ser Gly His Thr Val  Thr Asp Asp Ile Asp  His Phe Phe
    1175                1180                1185

Ser Ala  Pro Ser Ile Thr Tyr  Arg Glu Pro His Leu  Ser Ile Tyr
    1190                1195                1200

Asp Val  Leu Glu Val Gln Lys  Glu Glu Leu Asp Leu  Ser Lys Asp
    1205                1210                1215

Leu Met  Val Leu Pro Asn Ala  Pro Asn Arg Val Phe  Ala Trp Glu
    1220                1225                1230

Thr Gly  Trp Thr Pro Gly Leu  Arg Ser Leu Glu Asn  Asp Gly Thr
    1235                1240                1245

Lys Leu  Leu Asp Arg Ile Arg  Asp Asn Tyr Glu Gly  Glu Phe Tyr
    1250                1255                1260

Trp Arg  Tyr Phe Ala Phe Ile  Ala Asp Ala Leu Ile  Thr Thr Leu
    1265                1270                1275

Lys Pro  Arg Tyr Glu Asp Thr  Asn Ile Arg Ile Asn  Leu Asp Ser
    1280                1285                1290

Asn Thr  Arg Ser Phe Ile Val  Pro Ile Ile Thr Thr  Glu Tyr Ile
    1295                1300                1305

Arg Glu  Lys Leu Ser Tyr Ser  Phe Tyr Gly Ser Gly  Gly Thr Tyr
    1310                1315                1320

Ala Leu  Ser Leu Ser Gln Tyr  Asn Met Gly Ile Asn  Ile Glu Leu
    1325                1330                1335

Ser Glu  Ser Asp Val Trp Ile  Ile Asp Val Asp Asn  Val Val Arg
    1340                1345                1350
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Asp Val  Thr Ile Glu Ser Asp  Lys Ile Lys Lys Gly  Asp Leu Ile
    1355                1360                1365

Glu Gly  Ile Leu Ser Thr Leu  Ser Ile Glu Glu Asn  Lys Ile Ile
    1370                1375                1380

Leu Asn  Ser His Glu Ile Asn  Phe Ser Gly Glu Val  Asn Gly Ser
    1385                1390                1395

Asn Gly  Phe Val Ser Leu Thr  Phe Ser Ile Leu Glu  Gly Ile Asn
    1400                1405                1410

Ala Ile  Ile Glu Val Asp Leu  Leu Ser Lys Ser Tyr  Lys Leu Leu
    1415                1420                1425

Ile Ser  Gly Glu Leu Lys Ile  Leu Met Leu Asn Ser  Asn His Ile
    1430                1435                1440

Gln Gln  Lys Ile Asp Tyr Ile  Gly Phe Asn Ser Glu  Leu Gln Lys
    1445                1450                1455

Asn Ile  Pro Tyr Ser Phe Val  Asp Ser Glu Gly Lys  Glu Asn Gly
    1460                1465                1470

Phe Ile  Asn Gly Ser Thr Lys  Glu Gly Leu Phe Val  Ser Glu Leu
    1475                1480                1485

Pro Asp  Val Val Leu Ile Ser  Lys Val Tyr Met Asp  Asp Ser Lys
    1490                1495                1500

Pro Ser  Phe Gly Tyr Tyr Ser  Asn Asn Leu Lys Asp  Val Lys Val
    1505                1510                1515

Ile Thr  Lys Asp Asn Val Asn  Ile Leu Thr Gly Tyr  Tyr Leu Lys
    1520                1525                1530

Asp Asp  Ile Lys Ile Ser Leu  Ser Leu Thr Leu Gln  Asp Glu Lys
    1535                1540                1545
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Thr Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala
1550 1555 1560

Glu Ile Leu Lys Phe Met Asn Arg Lys Gly Asn Thr Asn Thr Ser
1565 1570 1575

Asp Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile
1580 1585 1590

Phe Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala
1595 1600 1605

Asn Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe
1610 1615 1620

Ile Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe
1625 1630 1635

Asn Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln
1640 1645 1650

Asn Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp
1655 1660 1665

Ile Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly
1670 1675 1680

Ile Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr
1685 1690 1695

Thr Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr
1700 1705 1710

Tyr Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys
1715 1720 1725

Ile Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser
1730 1735 1740

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```
Asn Asp  Gly Asn Asp Phe Ile  Leu Met Ser Thr Ser  Glu Glu Asn
    1745                1750                1755

Lys Val  Ser Gln Val Lys Ile  Arg Phe Val Asn Val  Phe Lys Asp
    1760                1765                1770

Lys Thr  Leu Ala Asn Lys Leu  Ser Phe Asn Phe Ser  Asp Lys Gln
    1775                1780                1785

Asp Val  Pro Val Ser Glu Ile  Ile Leu Ser Phe Thr  Pro Ser Tyr
    1790                1795                1800

Tyr Glu  Asp Gly Leu Ile Gly  Tyr Asp Leu Gly Leu  Val Ser Leu
    1805                1810                1815

Tyr Asn  Glu Lys Phe Tyr Ile  Asn Asn Phe Gly Met  Met Val Ser
    1820                1825                1830

Gly Leu  Ile Tyr Ile Asn Asp  Ser Leu Tyr Tyr Phe  Lys Pro Pro
    1835                1840                1845

Val Asn  Asn Leu Ile Thr Gly  Phe Val Thr Val Gly  Asp Asp Lys
    1850                1855                1860

Tyr Tyr  Phe Asn Pro Ile Asn  Gly Gly Ala Ala Ser  Ile Gly Glu
    1865                1870                1875

Thr Ile  Ile Asp Asp Lys Asn  Tyr Tyr Phe Asn Gln  Ser Gly Val
    1880                1885                1890

Leu Gln  Thr Gly Val Phe Ser  Thr Glu Asp Gly Phe  Lys Tyr Phe
    1895                1900                1905

Ala Pro  Ala Asn Thr Leu Asp  Glu Asn Leu Glu Gly  Glu Ala Ile
    1910                1915                1920

Asp Phe  Thr Gly Lys Leu Ile  Ile Asp Glu Asn Ile  Tyr Tyr Phe
    1925                1930                1935
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```
Asp Asp  Asn Tyr Arg Gly Ala  Val Glu Trp Lys Glu  Leu Asp Gly
    1940                1945                1950

Glu Met  His Tyr Phe Ser Pro  Glu Thr Gly Lys Ala  Phe Lys Gly
    1955                1960                1965

Leu Asn  Gln Ile Gly Asp Tyr  Lys Tyr Tyr Phe Asn  Ser Asp Gly
    1970                1975                1980

Val Met  Gln Lys Gly Phe Val  Ser Ile Asn Asp Asn  Lys His Tyr
    1985                1990                1995

Phe Asp  Asp Ser Gly Val Met  Lys Val Gly Tyr Thr  Glu Ile Asp
    2000                2005                2010

Gly Lys  His Phe Tyr Phe Ala  Glu Asn Gly Glu Met  Gln Ile Gly
    2015                2020                2025

Val Phe  Asn Thr Glu Asp Gly  Phe Lys Tyr Phe Ala  His His Asn
    2030                2035                2040

Glu Asp  Leu Gly Asn Glu Glu  Gly Glu Glu Ile Ser  Tyr Ser Gly
    2045                2050                2055

Ile Leu  Asn Phe Asn Asn Lys  Ile Tyr Tyr Phe Asp  Asp Ser Phe
    2060                2065                2070

Thr Ala  Val Val Gly Trp Lys  Asp Leu Glu Asp Gly  Ser Lys Tyr
    2075                2080                2085

Tyr Phe  Asp Glu Asp Thr Ala  Glu Ala Tyr Ile Gly  Leu Ser Leu
    2090                2095                2100

Ile Asn  Asp Gly Gln Tyr Tyr  Phe Asn Asp Asp Gly  Ile Met Gln
    2105                2110                2115

Val Gly  Phe Val Thr Ile Asn  Asp Lys Val Phe Tyr  Phe Ser Asp
    2120                2125                2130
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Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
2135 2140 2145

Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp
2150 2155 2160

Thr Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn
2165 2170 2175

Asp Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg
2180 2185 2190

Val Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu
2195 2200 2205

Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile
2225 2230 2235

Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr
2240 2245 2250

Gly Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn
2255 2260 2265

Gly Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe
2270 2275 2280

Tyr Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr
2285 2290 2295

Pro Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu
2300 2305 2310

Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu
2315 2320 2325

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Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr
2330 2335 2340

Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp
2345 2350 2355

Thr Ala Gln Leu Val Ile Ser Glu
2360 2365

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<211> 2710
<212> PRT
<213> Artificial

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Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
20 25 30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
35 40 45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr
50 55 60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65 70 75 80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
100 105 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
115 120 125

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```
Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
    130                 135                 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
    290                 295                 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
                325                 330                 335
```

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```
Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
            340                 345                 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
        355                 360                 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
    370                 375                 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385                 390                 395                 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
                405                 410                 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
            420                 425                 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
        435                 440                 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
    450                 455                 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465                 470                 475                 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
                485                 490                 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
            500                 505                 510

Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
        515                 520                 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
    530                 535                 540
```

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```
Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545                 550                 555                 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
                565                 570                 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
            580                 585                 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
        595                 600                 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
    610                 615                 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625                 630                 635                 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
                645                 650                 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
            660                 665                 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
        675                 680                 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
    690                 695                 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705                 710                 715                 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser
                725                 730                 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
            740                 745                 750
```

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```
Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
        755                 760                 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
    770                 775                 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785                 790                 795                 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
                805                 810                 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
            820                 825                 830

Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
        835                 840                 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
    850                 855                 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865                 870                 875                 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
                885                 890                 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
            900                 905                 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
        915                 920                 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
    930                 935                 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945                 950                 955                 960
```

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```
Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
               965                 970                 975

Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
            980                 985                 990

Ala Gln Leu Phe Ser Thr Gly Leu  Asn Thr Ile Tyr Asp  Ser Ile Gln
        995                 1000                1005

Leu Val  Asn Leu Ile Ser Asn  Ala Val Asn Asp Thr  Ile Asn Val
    1010                1015                1020

Leu Pro  Thr Ile Thr Glu Gly  Ile Pro Ile Val Ser  Thr Ile Leu
    1025                1030                1035

Asp Gly  Ile Asn Leu Gly Ala  Ala Ile Lys Glu Leu  Leu Asp Glu
    1040                1045                1050

His Asp  Pro Leu Leu Lys Lys  Glu Leu Glu Ala Lys  Val Gly Val
    1055                1060                1065

Leu Ala  Ile Asn Met Ser Leu  Ser Ile Ala Ala Thr  Val Ala Ser
    1070                1075                1080

Ile Val  Gly Ile Gly Ala Glu  Val Thr Ile Phe Leu  Leu Pro Ile
    1085                1090                1095

Ala Gly  Ile Ser Ala Gly Ile  Pro Ser Leu Val Asn  Asn Glu Leu
    1100                1105                1110

Ile Leu  His Asp Lys Ala Thr  Ser Val Val Asn Tyr  Phe Asn His
    1115                1120                1125

Leu Ser  Glu Ser Lys Lys Tyr  Gly Pro Leu Lys Thr  Glu Asp Asp
    1130                1135                1140

Lys Ile  Leu Val Pro Ile Asp  Asp Leu Val Ile Ser  Glu Ile Asp
    1145                1150                1155
```

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```
Phe Asn  Asn Asn Ser Ile Lys  Leu Gly Thr Cys Asn  Ile Leu Ala
    1160                 1165                 1170

Met Glu  Gly Gly Ser Gly His  Thr Val Thr Gly Asn  Ile Asp His
    1175                 1180                 1185

Phe Phe  Ser Ser Pro Ser Ile  Ser Ser His Ile Pro  Ser Leu Ser
    1190                 1195                 1200

Ile Tyr  Ser Ala Ile Gly Ile  Glu Thr Glu Asn Leu  Asp Phe Ser
    1205                 1210                 1215

Lys Lys  Ile Met Met Leu Pro  Asn Ala Pro Ser Arg  Val Phe Trp
    1220                 1225                 1230

Trp Glu  Thr Gly Ala Val Pro  Gly Leu Arg Ser Leu  Glu Asn Asp
    1235                 1240                 1245

Gly Thr  Arg Leu Leu Asp Ser  Ile Arg Asp Leu Tyr  Pro Gly Lys
    1250                 1255                 1260

Phe Tyr  Trp Arg Phe Tyr Ala  Phe Phe Asp Tyr Ala  Ile Thr Thr
    1265                 1270                 1275

Leu Lys  Pro Val Tyr Glu Asp  Thr Asn Ile Lys Ile  Lys Leu Asp
    1280                 1285                 1290

Lys Asp  Thr Arg Asn Phe Ile  Met Pro Thr Ile Thr  Thr Asn Glu
    1295                 1300                 1305

Ile Arg  Asn Lys Leu Ser Tyr  Ser Phe Asp Gly Ala  Gly Gly Thr
    1310                 1315                 1320

Tyr Ser  Leu Leu Leu Ser Ser  Tyr Pro Ile Ser Thr  Asn Ile Asn
    1325                 1330                 1335

Leu Ser  Lys Asp Asp Leu Trp  Ile Phe Asn Ile Asp  Asn Glu Val
    1340                 1345                 1350
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Arg Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu
1355 1360 1365

Ile Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu
1370 1375 1380

Ile Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn
1385 1390 1395

Lys Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile
1400 1405 1410

Ser Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu
1415 1420 1425

Leu Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn
1430 1435 1440

Ile Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile
1445 1450 1455

Ala Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala
1460 1465 1470

Ile Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp
1475 1480 1485

Ser Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe
1490 1495 1500

Asn Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys
1505 1510 1515

Asp Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn
1520 1525 1530

Thr Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn
1535 1540 1545

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Gln Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser
1550 1555 1560

Ser Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr
1565 1570 1575

Ser Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys
1580 1585 1590

Leu Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe
1595 1600 1605

Thr Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys
1610 1615 1620

Asp Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr
1625 1630 1635

Ser Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val
1640 1645 1650

Val Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser
1655 1660 1665

Thr Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg
1670 1675 1680

Tyr Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu
1685 1690 1695

Ile Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu
1700 1705 1710

Ile Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile
1715 1720 1725

Asn Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly
1730 1735 1740

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```
Ser Asp  Phe Ile Leu Val Arg  Tyr Leu Glu Glu Ser  Asn Lys Lys
    1745                1750                1755

Ile Leu  Gln Lys Ile Arg Ile  Lys Gly Ile Leu Ser  Asn Thr Gln
    1760                1765                1770

Ser Phe  Asn Lys Met Ser Ile  Asp Phe Lys Asp Ile  Lys Lys Leu
    1775                1780                1785

Ser Leu  Gly Tyr Ile Met Ser  Asn Phe Lys Ser Phe  Asn Ser Glu
    1790                1795                1800

Asn Glu  Leu Asp Arg Asp His  Leu Gly Phe Lys Ile  Ile Asp Asn
    1805                1810                1815

Lys Thr  Tyr Tyr Tyr Asp Glu  Asp Ser Lys Leu Val  Lys Gly Leu
    1820                1825                1830

Ile Asn  Ile Asn Asn Ser Leu  Phe Tyr Phe Asp Pro  Ile Glu Phe
    1835                1840                1845

Asn Leu  Val Thr Gly Trp Gln  Thr Ile Asn Gly Lys  Lys Tyr Tyr
    1850                1855                1860

Phe Asp  Ile Asn Thr Gly Ala  Ala Leu Ile Ser Tyr  Lys Ile Ile
    1865                1870                1875

Asn Gly  Lys His Phe Tyr Phe  Asn Asn Asp Gly Val  Met Gln Leu
    1880                1885                1890

Gly Val  Phe Lys Gly Pro Asp  Gly Phe Glu Tyr Phe  Ala Pro Ala
    1895                1900                1905

Asn Thr  Gln Asn Asn Asn Ile  Glu Gly Gln Ala Ile  Val Tyr Gln
    1910                1915                1920

Ser Lys  Phe Leu Thr Leu Asn  Gly Lys Lys Tyr Tyr  Phe Asp Asn
    1925                1930                1935
```

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```
Asp Ser  Lys Ala Val Thr Gly  Trp Arg Ile Ile Asn  Asn Glu Lys
    1940                1945                1950

Tyr Tyr  Phe Asn Pro Asn Asn  Ala Ile Ala Ala Val  Gly Leu Gln
    1955                1960                1965

Val Ile  Asp Asn Asn Lys Tyr  Tyr Phe Asn Pro Asp  Thr Ala Ile
    1970                1975                1980

Ile Ser  Lys Gly Trp Gln Thr  Val Asn Gly Ser Arg  Tyr Tyr Phe
    1985                1990                1995

Asp Thr  Asp Thr Ala Ile Ala  Phe Asn Gly Tyr Lys  Thr Ile Asp
    2000                2005                2010

Gly Lys  His Phe Tyr Phe Asp  Ser Asp Cys Val Val  Lys Ile Gly
    2015                2020                2025

Val Phe  Ser Thr Ser Asn Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2030                2035                2040

Thr Tyr  Asn Asn Asn Ile Glu  Gly Gln Ala Ile Val  Tyr Gln Ser
    2045                2050                2055

Lys Phe  Leu Thr Leu Asn Gly  Lys Lys Tyr Tyr Phe  Asp Asn Asn
    2060                2065                2070

Ser Lys  Ala Val Thr Gly Trp  Gln Thr Ile Asp Ser  Lys Lys Tyr
    2075                2080                2085

Tyr Phe  Asn Thr Asn Thr Ala  Glu Ala Ala Thr Gly  Trp Gln Thr
    2090                2095                2100

Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr Asn Thr  Ala Glu Ala
    2105                2110                2115

Ala Thr  Gly Trp Gln Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn
    2120                2125                2130
```

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```
Thr Asn  Thr Ala Ile Ala Ser  Thr Gly Tyr Thr Ile  Ile Asn Gly
    2135                2140                2145

Lys His  Phe Tyr Phe Asn Thr  Asp Gly Ile Met Gln  Ile Gly Val
    2150                2155                2160

Phe Lys  Gly Pro Asn Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr
    2165                2170                2175

Asp Ala  Asn Asn Ile Glu Gly  Gln Ala Ile Leu Tyr  Gln Asn Glu
    2180                2185                2190

Phe Leu  Thr Leu Asn Gly Lys  Lys Tyr Tyr Phe Gly  Ser Asp Ser
    2195                2200                2205

Lys Ala  Val Thr Gly Trp Arg  Ile Ile Asn Asn Lys  Lys Tyr Tyr
    2210                2215                2220

Phe Asn  Pro Asn Asn Ala Ile  Ala Ala Ile His Leu  Cys Thr Ile
    2225                2230                2235

Asn Asn  Asp Lys Tyr Tyr Phe  Ser Tyr Asp Gly Ile  Leu Gln Asn
    2240                2245                2250

Gly Tyr  Ile Thr Ile Glu Arg  Asn Asn Phe Tyr Phe  Asp Ala Asn
    2255                2260                2265

Asn Glu  Ser Lys Met Val Thr  Gly Val Phe Lys Gly  Pro Asn Gly
    2270                2275                2280

Phe Glu  Tyr Phe Ala Pro Ala  Asn Thr His Asn Asn  Asn Ile Glu
    2285                2290                2295

Gly Gln  Ala Ile Val Tyr Gln  Asn Lys Phe Leu Thr  Leu Asn Gly
    2300                2305                2310

Lys Lys  Tyr Tyr Phe Asp Asn  Asp Ser Lys Ala Val  Thr Gly Trp
    2315                2320                2325
```

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```
Gln Thr  Ile Asp Gly Lys Lys  Tyr Tyr Phe Asn Leu  Asn Thr Ala
    2330                2335                2340

Glu Ala  Ala Thr Gly Trp Gln  Thr Ile Asp Gly Lys  Lys Tyr Tyr
    2345                2350                2355

Phe Asn  Leu Asn Thr Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile
    2360                2365                2370

Asp Gly  Lys Lys Tyr Tyr Phe  Asn Thr Asn Thr Phe  Ile Ala Ser
    2375                2380                2385

Thr Gly  Tyr Thr Ser Ile Asn  Gly Lys His Phe Tyr  Phe Asn Thr
    2390                2395                2400

Asp Gly  Ile Met Gln Ile Gly  Val Phe Lys Gly Pro  Asn Gly Phe
    2405                2410                2415

Glu Tyr  Phe Ala Pro Ala Asn  Thr His Asn Asn Asn  Ile Glu Gly
    2420                2425                2430

Gln Ala  Ile Leu Tyr Gln Asn  Lys Phe Leu Thr Leu  Asn Gly Lys
    2435                2440                2445

Lys Tyr  Tyr Phe Gly Ser Asp  Ser Lys Ala Val Thr  Gly Leu Arg
    2450                2455                2460

Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn Thr Asn  Thr Ala Val
    2465                2470                2475

Ala Val  Thr Gly Trp Gln Thr  Ile Asn Gly Lys Lys  Tyr Tyr Phe
    2480                2485                2490

Asn Thr  Asn Thr Ser Ile Ala  Ser Thr Gly Tyr Thr  Ile Ile Ser
    2495                2500                2505

Gly Lys  His Phe Tyr Phe Asn  Thr Asp Gly Ile Met  Gln Ile Gly
    2510                2515                2520
```

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```
Val Phe  Lys Gly Pro Asp Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2525                2530                2535

Thr Asp  Ala Asn Asn Ile Glu  Gly Gln Ala Ile Arg  Tyr Gln Asn
    2540                2545                2550

Arg Phe  Leu Tyr Leu His Asp  Asn Ile Tyr Tyr Phe  Gly Asn Asn
    2555                2560                2565

Ser Lys  Ala Ala Thr Gly Trp  Val Thr Ile Asp Gly  Asn Arg Tyr
    2570                2575                2580

Tyr Phe  Glu Pro Asn Thr Ala  Met Gly Ala Asn Gly  Tyr Lys Thr
    2585                2590                2595

Ile Asp  Asn Lys Asn Phe Tyr  Phe Arg Asn Gly Leu  Pro Gln Ile
    2600                2605                2610

Gly Val  Phe Lys Gly Ser Asn  Gly Phe Glu Tyr Phe  Ala Pro Ala
    2615                2620                2625

Asn Thr  Asp Ala Asn Asn Ile  Glu Gly Gln Ala Ile  Arg Tyr Gln
    2630                2635                2640

Asn Arg  Phe Leu His Leu Leu  Gly Lys Ile Tyr Tyr  Phe Gly Asn
    2645                2650                2655

Asn Ser  Lys Ala Val Thr Gly  Trp Gln Thr Ile Asn  Gly Lys Val
    2660                2665                2670

Tyr Tyr  Phe Met Pro Asp Thr  Ala Met Ala Ala Ala  Gly Gly Leu
    2675                2680                2685

Phe Glu  Ile Asp Gly Val Ile  Tyr Phe Phe Gly Val  Asp Gly Val
    2690                2695                2700

Lys Ala  Pro Gly Ile Tyr Gly
    2705                2710
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<210> 4
<211> 2710
<212> PRT
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Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
            20                  25                  30


Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
        35                  40                  45


Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr
    50                  55                  60


Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65                  70                  75                  80


Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
                85                  90                  95


Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
            100                 105                 110


Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
        115                 120                 125


Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
    130                 135                 140


Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145                 150                 155                 160
```

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```
Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
    290                 295                 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
                325                 330                 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
            340                 345                 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
        355                 360                 365
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```
Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
    370                 375                 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385                 390                 395                 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
                405                 410                 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
            420                 425                 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
        435                 440                 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
    450                 455                 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465                 470                 475                 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
                485                 490                 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
            500                 505                 510

Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
        515                 520                 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
    530                 535                 540

Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545                 550                 555                 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
                565                 570                 575
```

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```
Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
            580                 585                 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
        595                 600                 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
    610                 615                 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625                 630                 635                 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
                645                 650                 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
            660                 665                 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
        675                 680                 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser
    690                 695                 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705                 710                 715                 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser
                725                 730                 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
            740                 745                 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
        755                 760                 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
    770                 775                 780
```

```
Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785                 790                 795                 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
                805                 810                 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
            820                 825                 830

Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
        835                 840                 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
    850                 855                 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865                 870                 875                 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
                885                 890                 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
            900                 905                 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
        915                 920                 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
    930                 935                 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945                 950                 955                 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
                965                 970                 975

Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
            980                 985                 990
```

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```
Ala Gln Leu Phe Ser Thr Gly Leu  Asn Thr Ile Tyr Asp  Ser Ile Gln
        995                 1000                1005

Leu Val  Asn Leu Ile Ser Asn  Ala Val Asn Asp Thr  Ile Asn Val
    1010                1015                1020

Leu Pro  Thr Ile Thr Glu Gly  Ile Pro Ile Val Ser  Thr Ile Leu
    1025                1030                1035

Asp Gly  Ile Asn Leu Gly Ala  Ala Ile Lys Glu Leu  Leu Asp Glu
    1040                1045                1050

His Asp  Pro Leu Leu Lys Lys  Glu Leu Glu Ala Lys  Val Gly Val
    1055                1060                1065

Leu Ala  Ile Asn Met Ser Leu  Ser Ile Ala Ala Thr  Val Ala Ser
    1070                1075                1080

Ile Val  Gly Ile Gly Ala Glu  Val Thr Ile Phe Leu  Leu Pro Ile
    1085                1090                1095

Ala Gly  Ile Ser Ala Gly Ile  Pro Ser Leu Val Asn  Asn Glu Leu
    1100                1105                1110

Ile Leu  His Asp Lys Ala Thr  Ser Val Val Asn Tyr  Phe Asn His
    1115                1120                1125

Leu Ser  Glu Ser Lys Lys Tyr  Gly Pro Leu Lys Thr  Glu Asp Asp
    1130                1135                1140

Lys Ile  Leu Val Pro Ile Asp  Asp Leu Val Ile Ser  Glu Ile Asp
    1145                1150                1155

Phe Asn  Asn Asn Ser Ile Lys  Leu Gly Thr Cys Asn  Ile Leu Ala
    1160                1165                1170

Met Glu  Gly Gly Ser Gly His  Thr Val Thr Gly Asn  Ile Asp His
    1175                1180                1185
```

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```
Phe Phe  Ser Ser Pro Ser Ile  Ser Ser His Ile Pro  Ser Leu Ser
    1190                1195                1200

Ile Tyr  Ser Ala Ile Gly Ile  Glu Thr Glu Asn Leu  Asp Phe Ser
    1205                1210                1215

Lys Lys  Ile Met Met Leu Pro  Asn Ala Pro Ser Arg  Val Phe Trp
    1220                1225                1230

Trp Glu  Thr Gly Ala Val Pro  Gly Leu Arg Ser Leu  Glu Asn Asp
    1235                1240                1245

Gly Thr  Arg Leu Leu Asp Ser  Ile Arg Asp Leu Tyr  Pro Gly Lys
    1250                1255                1260

Phe Tyr  Trp Arg Phe Tyr Ala  Phe Phe Asp Tyr Ala  Ile Thr Thr
    1265                1270                1275

Leu Lys  Pro Val Tyr Glu Asp  Thr Asn Ile Lys Ile  Lys Leu Asp
    1280                1285                1290

Lys Asp  Thr Arg Asn Phe Ile  Met Pro Thr Ile Thr  Thr Asn Glu
    1295                1300                1305

Ile Arg  Asn Lys Leu Ser Tyr  Ser Phe Asp Gly Ala  Gly Gly Thr
    1310                1315                1320

Tyr Ser  Leu Leu Leu Ser Ser  Tyr Pro Ile Ser Thr  Asn Ile Asn
    1325                1330                1335

Leu Ser  Lys Asp Asp Leu Trp  Ile Phe Asn Ile Asp  Asn Glu Val
    1340                1345                1350

Arg Glu  Ile Ser Ile Glu Asn  Gly Thr Ile Lys Lys  Gly Lys Leu
    1355                1360                1365

Ile Lys  Asp Val Leu Ser Lys  Ile Asp Ile Asn Lys  Asn Lys Leu
    1370                1375                1380
```

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```
Ile Ile  Gly Asn Gln Thr Ile  Asp Phe Ser Gly Asp  Ile Asp Asn
    1385                1390                1395

Lys Asp  Arg Tyr Ile Phe Leu  Thr Cys Glu Leu Asp  Asp Lys Ile
    1400                1405                1410

Ser Leu  Ile Ile Glu Ile Asn  Leu Val Ala Lys Ser  Tyr Ser Leu
    1415                1420                1425

Leu Leu  Ser Gly Asp Lys Asn  Tyr Leu Ile Ser Asn  Leu Ser Asn
    1430                1435                1440

Ile Ile  Glu Lys Ile Asn Thr  Leu Gly Leu Asp Ser  Lys Asn Ile
    1445                1450                1455

Ala Tyr  Asn Tyr Thr Asp Glu  Ser Asn Asn Lys Tyr  Phe Gly Ala
    1460                1465                1470

Ile Ser  Lys Thr Ser Gln Lys  Ser Ile Ile His Tyr  Lys Lys Asp
    1475                1480                1485

Ser Lys  Asn Ile Leu Glu Phe  Tyr Asn Asp Ser Thr  Leu Glu Phe
    1490                1495                1500

Asn Ser  Lys Asp Phe Ile Ala  Glu Asp Ile Asn Val  Phe Met Lys
    1505                1510                1515

Asp Asp  Ile Asn Thr Ile Thr  Gly Lys Tyr Tyr Val  Asp Asn Asn
    1520                1525                1530

Thr Asp  Lys Ser Ile Asp Phe  Ser Ile Ser Leu Val  Ser Lys Asn
    1535                1540                1545

Gln Val  Lys Val Asn Gly Leu  Tyr Leu Asn Glu Ser  Val Tyr Ser
    1550                1555                1560

Ser Tyr  Leu Asp Phe Val Lys  Asn Ser Asp Gly His  His Asn Thr
    1565                1570                1575
```

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```
Ser Asn  Phe Met Asn Leu Phe  Leu Asp Asn Ile Ser  Phe Trp Lys
    1580                1585                1590

Leu Phe  Gly Phe Glu Asn Ile  Asn Phe Val Ile Asp  Lys Tyr Phe
    1595                1600                1605

Thr Leu  Val Gly Lys Thr Asn  Leu Gly Tyr Val Glu  Phe Ile Cys
    1610                1615                1620

Asp Asn  Asn Lys Asn Ile Asp  Ile Tyr Phe Gly Glu  Trp Lys Thr
    1625                1630                1635

Ser Ser  Ser Lys Ser Thr Ile  Phe Ser Gly Asn Gly  Arg Asn Val
    1640                1645                1650

Val Val  Glu Pro Ile Tyr Asn  Pro Asp Thr Gly Glu  Asp Ile Ser
    1655                1660                1665

Thr Ser  Leu Asp Phe Ser Tyr  Glu Pro Leu Tyr Gly  Ile Asp Arg
    1670                1675                1680

Tyr Ile  Asn Lys Val Leu Ile  Ala Pro Asp Leu Tyr  Thr Ser Leu
    1685                1690                1695

Ile Asn  Ile Asn Thr Asn Tyr  Tyr Ser Asn Glu Tyr  Tyr Pro Glu
    1700                1705                1710

Ile Ile  Val Leu Asn Pro Asn  Thr Phe His Lys Lys  Val Asn Ile
    1715                1720                1725

Asn Leu  Asp Ser Ser Ser Phe  Glu Tyr Lys Trp Ser  Thr Glu Gly
    1730                1735                1740

Ser Asp  Phe Ile Leu Val Arg  Tyr Leu Glu Glu Ser  Asn Lys Lys
    1745                1750                1755

Ile Leu  Gln Lys Ile Arg Ile  Lys Gly Ile Leu Ser  Asn Thr Gln
    1760                1765                1770
```

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```
Ser Phe  Asn Lys Met Ser Ile  Asp Phe Lys Asp Ile  Lys Lys Leu
    1775                1780                1785

Ser Leu  Gly Tyr Ile Met Ser  Asn Phe Lys Ser Phe  Asn Ser Glu
    1790                1795                1800

Asn Glu  Leu Asp Arg Asp His  Leu Gly Phe Lys Ile  Ile Asp Asn
    1805                1810                1815

Lys Thr  Tyr Tyr Tyr Asp Glu  Asp Ser Lys Leu Val  Lys Gly Leu
    1820                1825                1830

Ile Asn  Ile Asn Asn Ser Leu  Phe Tyr Phe Asp Pro  Ile Glu Phe
    1835                1840                1845

Asn Leu  Val Thr Gly Trp Gln  Thr Ile Asn Gly Lys  Lys Tyr Tyr
    1850                1855                1860

Phe Asp  Ile Asn Thr Gly Ala  Ala Leu Ile Ser Tyr  Lys Ile Ile
    1865                1870                1875

Asn Gly  Lys His Phe Tyr Phe  Asn Asn Asp Gly Val  Met Gln Leu
    1880                1885                1890

Gly Val  Phe Lys Gly Pro Asp  Gly Phe Glu Tyr Phe  Ala Pro Ala
    1895                1900                1905

Asn Thr  Gln Asn Asn Asn Ile  Glu Gly Gln Ala Ile  Val Tyr Gln
    1910                1915                1920

Ser Lys  Phe Leu Thr Leu Asn  Gly Lys Lys Tyr Tyr  Phe Asp Asn
    1925                1930                1935

Asp Ser  Lys Ala Val Thr Gly  Trp Arg Ile Ile Asn  Asn Glu Lys
    1940                1945                1950

Tyr Tyr  Phe Asn Pro Asn Asn  Ala Ile Ala Ala Val  Gly Leu Gln
    1955                1960                1965
```

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Val Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile
1970 1975 1980

Ile Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe
1985 1990 1995

Asp Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp
2000 2005 2010

Gly Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly
2015 2020 2025

Val Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2030 2035 2040

Thr Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
2045 2050 2055

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
2060 2065 2070

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr
2075 2080 2085

Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr
2090 2095 2100

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala
2105 2110 2115

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2120 2125 2130

Thr Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
2135 2140 2145

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2150 2155 2160

```
Phe Lys  Gly Pro Asn Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr
    2165                2170                2175

Asp Ala  Asn Asn Ile Glu Gly  Gln Ala Ile Leu Tyr  Gln Asn Glu
    2180                2185                2190

Phe Leu  Thr Leu Asn Gly Lys  Lys Tyr Tyr Phe Gly  Ser Asp Ser
    2195                2200                2205

Lys Ala  Val Thr Gly Trp Arg  Ile Ile Asn Asn Lys  Lys Tyr Tyr
    2210                2215                2220

Phe Asn  Pro Asn Asn Ala Ile  Ala Ala Ile His Leu  Cys Thr Ile
    2225                2230                2235

Asn Asn  Asp Lys Tyr Tyr Phe  Ser Tyr Asp Gly Ile  Leu Gln Asn
    2240                2245                2250

Gly Tyr  Ile Thr Ile Glu Arg  Asn Asn Phe Tyr Phe  Asp Ala Asn
    2255                2260                2265

Asn Glu  Ser Lys Met Val Thr  Gly Val Phe Lys Gly  Pro Asn Gly
    2270                2275                2280

Phe Glu  Tyr Phe Ala Pro Ala  Asn Thr His Asn Asn  Asn Ile Glu
    2285                2290                2295

Gly Gln  Ala Ile Val Tyr Gln  Asn Lys Phe Leu Thr  Leu Asn Gly
    2300                2305                2310

Lys Lys  Tyr Tyr Phe Asp Asn  Asp Ser Lys Ala Val  Thr Gly Trp
    2315                2320                2325

Gln Thr  Ile Asp Gly Lys Lys  Tyr Tyr Phe Asn Leu  Asn Thr Ala
    2330                2335                2340

Glu Ala  Ala Thr Gly Trp Gln  Thr Ile Asp Gly Lys  Lys Tyr Tyr
    2345                2350                2355
```

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```
Phe Asn  Leu Asn Thr Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile
    2360                2365                2370

Asp Gly  Lys Lys Tyr Tyr Phe  Asn Thr Asn Thr Phe  Ile Ala Ser
    2375                2380                2385

Thr Gly  Tyr Thr Ser Ile Asn  Gly Lys His Phe Tyr  Phe Asn Thr
    2390                2395                2400

Asp Gly  Ile Met Gln Ile Gly  Val Phe Lys Gly Pro  Asn Gly Phe
    2405                2410                2415

Glu Tyr  Phe Ala Pro Ala Asn  Thr His Asn Asn Asn  Ile Glu Gly
    2420                2425                2430

Gln Ala  Ile Leu Tyr Gln Asn  Lys Phe Leu Thr Leu  Asn Gly Lys
    2435                2440                2445

Lys Tyr  Tyr Phe Gly Ser Asp  Ser Lys Ala Val Thr  Gly Leu Arg
    2450                2455                2460

Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn Thr Asn  Thr Ala Val
    2465                2470                2475

Ala Val  Thr Gly Trp Gln Thr  Ile Asn Gly Lys Lys  Tyr Tyr Phe
    2480                2485                2490

Asn Thr  Asn Thr Ser Ile Ala  Ser Thr Gly Tyr Thr  Ile Ile Ser
    2495                2500                2505

Gly Lys  His Phe Tyr Phe Asn  Thr Asp Gly Ile Met  Gln Ile Gly
    2510                2515                2520

Val Phe  Lys Gly Pro Asp Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2525                2530                2535

Thr Asp  Ala Asn Asn Ile Glu  Gly Gln Ala Ile Arg  Tyr Gln Asn
    2540                2545                2550
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Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn
2555 2560 2565

Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr
2570 2575 2580

Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr
2585 2590 2595

Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile
2600 2605 2610

Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala
2615 2620 2625

Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln
2630 2635 2640

Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly
2705 2710

<210> 5
<211> 2366
<212> PRT
<213> Artificial

<220>
<223> Synthetic amino acid sequence: TcdB (D286A D288A mutations)

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<400> 5

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Met Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg
1               5                  10                  15

Phe Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
            20                  25                  30

Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
        35                  40                  45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
    50                  55                  60

Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65                  70                  75                  80

Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys
                85                  90                  95

Asn Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
            100                 105                 110

Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
        115                 120                 125

Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
    130                 135                 140

Val Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145                 150                 155                 160

Leu Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met
                165                 170                 175

Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala
            180                 185                 190

Gln Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr
        195                 200                 205
```

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```
Tyr Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr
    210                 215                 220

Ile Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val
225                 230                 235                 240

Arg Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu
                245                 250                 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu
            260                 265                 270

Arg Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Ala Val Ala
        275                 280                 285

Met Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro
    290                 295                 300

Ser Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile
305                 310                 315                 320

Met Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp
                325                 330                 335

Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
            340                 345                 350

Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala
        355                 360                 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn
    370                 375                 380

Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val
385                 390                 395                 400

Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro
                405                 410                 415
```

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```
Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile
            420                 425                 430

Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met
        435                 440                 445

Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr
    450                 455                 460

Thr Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp
465                 470                 475                 480

Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala
                485                 490                 495

Asp Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr
            500                 505                 510

Glu Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys
        515                 520                 525

Ala Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly
    530                 535                 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu
545                 550                 555                 560

Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly
                565                 570                 575

Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
            580                 585                 590

Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe
        595                 600                 605

Gln Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly
    610                 615                 620
```

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```
Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile
625                 630                 635                 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp
                645                 650                 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser
            660                 665                 670

Thr Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro
        675                 680                 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser
    690                 695                 700

Ile Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys
705                 710                 715                 720

Asp Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
                725                 730                 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg
            740                 745                 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
        755                 760                 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
    770                 775                 780

Asn Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785                 790                 795                 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu
                805                 810                 815

Glu Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
            820                 825                 830
```

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```
Asp Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr
        835                 840                 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser
    850                 855                 860

Ile Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp
865                 870                 875                 880

Ser His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe
                885                 890                 895

Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
            900                 905                 910

Thr Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu
        915                 920                 925

Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
    930                 935                 940

Val Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn
945                 950                 955                 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu
                965                 970                 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
            980                 985                 990

Leu Phe Ser Thr Gly Leu Asn Thr  Ile Thr Asp Ala Ala  Lys Val Val
        995                 1000                1005

Glu Leu  Val Ser Thr Ala Leu  Asp Glu Thr Ile Asp  Leu Leu Pro
    1010                1015                1020

Thr Leu  Ser Glu Gly Leu Pro  Ile Ile Ala Thr Ile  Ile Asp Gly
    1025                1030                1035
```

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Val Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp
1040 1045 1050

Pro Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala
1055 1060 1065

Val Asn Leu Thr Thr Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu
1070 1075 1080

Gly Ile Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly
1085 1090 1095

Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu
1100 1105 1110

Arg Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Val Ser
1115 1120 1125

Leu Val Glu Thr Glu Gly Val Phe Thr Leu Leu Asp Asp Lys Ile
1130 1135 1140

Met Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn
1145 1150 1155

Asn Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu
1160 1165 1170

Gly Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe
1175 1180 1185

Ser Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr
1190 1195 1200

Asp Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp
1205 1210 1215

Leu Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu
1220 1225 1230

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Thr Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr
1235 1240 1245

Lys Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr
1250 1255 1260

Trp Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu
1265 1270 1275

Lys Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser
1280 1285 1290

Asn Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile
1295 1300 1305

Arg Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr
1310 1315 1320

Ala Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu
1325 1330 1335

Ser Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg
1340 1345 1350

Asp Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile
1355 1360 1365

Glu Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile
1370 1375 1380

Leu Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser
1385 1390 1395

Asn Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn
1400 1405 1410

Ala Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu
1415 1420 1425

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Ile Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile
1430 1435 1440

Gln Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys
1445 1450 1455

Asn Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly
1460 1465 1470

Phe Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu
1475 1480 1485

Pro Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys
1490 1495 1500

Pro Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val
1505 1510 1515

Ile Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys
1520 1525 1530

Asp Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys
1535 1540 1545

Thr Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala
1550 1555 1560

Glu Ile Leu Lys Phe Met Asn Arg Lys Gly Asn Thr Asn Thr Ser
1565 1570 1575

Asp Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile
1580 1585 1590

Phe Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala
1595 1600 1605

Asn Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe
1610 1615 1620

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```
Ile Cys  Asp Glu Asn Asp Asn  Ile Gln Pro Tyr Phe  Ile Lys Phe
    1625                1630                1635

Asn Thr  Leu Glu Thr Asn Tyr  Thr Leu Tyr Val Gly  Asn Arg Gln
    1640                1645                1650

Asn Met  Ile Val Glu Pro Asn  Tyr Asp Leu Asp Asp  Ser Gly Asp
    1655                1660                1665

Ile Ser  Ser Thr Val Ile Asn  Phe Ser Gln Lys Tyr  Leu Tyr Gly
    1670                1675                1680

Ile Asp  Ser Cys Val Asn Lys  Val Val Ile Ser Pro  Asn Ile Tyr
    1685                1690                1695

Thr Asp  Glu Ile Asn Ile Thr  Pro Val Tyr Glu Thr  Asn Asn Thr
    1700                1705                1710

Tyr Pro  Glu Val Ile Val Leu  Asp Ala Asn Tyr Ile  Asn Glu Lys
    1715                1720                1725

Ile Asn  Val Asn Ile Asn Asp  Leu Ser Ile Arg Tyr  Val Trp Ser
    1730                1735                1740

Asn Asp  Gly Asn Asp Phe Ile  Leu Met Ser Thr Ser  Glu Glu Asn
    1745                1750                1755

Lys Val  Ser Gln Val Lys Ile  Arg Phe Val Asn Val  Phe Lys Asp
    1760                1765                1770

Lys Thr  Leu Ala Asn Lys Leu  Ser Phe Asn Phe Ser  Asp Lys Gln
    1775                1780                1785

Asp Val  Pro Val Ser Glu Ile  Ile Leu Ser Phe Thr  Pro Ser Tyr
    1790                1795                1800

Tyr Glu  Asp Gly Leu Ile Gly  Tyr Asp Leu Gly Leu  Val Ser Leu
    1805                1810                1815
```

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```
Tyr Asn  Glu Lys Phe Tyr Ile  Asn Asn Phe Gly Met  Met Val Ser
    1820                1825                1830

Gly Leu  Ile Tyr Ile Asn Asp  Ser Leu Tyr Tyr Phe  Lys Pro Pro
    1835                1840                1845

Val Asn  Asn Leu Ile Thr Gly  Phe Val Thr Val Gly  Asp Asp Lys
    1850                1855                1860

Tyr Tyr  Phe Asn Pro Ile Asn  Gly Gly Ala Ala Ser  Ile Gly Glu
    1865                1870                1875

Thr Ile  Ile Asp Asp Lys Asn  Tyr Tyr Phe Asn Gln  Ser Gly Val
    1880                1885                1890

Leu Gln  Thr Gly Val Phe Ser  Thr Glu Asp Gly Phe  Lys Tyr Phe
    1895                1900                1905

Ala Pro  Ala Asn Thr Leu Asp  Glu Asn Leu Glu Gly  Glu Ala Ile
    1910                1915                1920

Asp Phe  Thr Gly Lys Leu Ile  Ile Asp Glu Asn Ile  Tyr Tyr Phe
    1925                1930                1935

Asp Asp  Asn Tyr Arg Gly Ala  Val Glu Trp Lys Glu  Leu Asp Gly
    1940                1945                1950

Glu Met  His Tyr Phe Ser Pro  Glu Thr Gly Lys Ala  Phe Lys Gly
    1955                1960                1965

Leu Asn  Gln Ile Gly Asp Tyr  Lys Tyr Tyr Phe Asn  Ser Asp Gly
    1970                1975                1980

Val Met  Gln Lys Gly Phe Val  Ser Ile Asn Asp Asn  Lys His Tyr
    1985                1990                1995

Phe Asp  Asp Ser Gly Val Met  Lys Val Gly Tyr Thr  Glu Ile Asp
    2000                2005                2010
```

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```
Gly Lys  His Phe Tyr Phe Ala  Glu Asn Gly Glu Met  Gln Ile Gly
    2015                2020                2025

Val Phe  Asn Thr Glu Asp Gly  Phe Lys Tyr Phe Ala  His His Asn
    2030                2035                2040

Glu Asp  Leu Gly Asn Glu Glu  Gly Glu Glu Ile Ser  Tyr Ser Gly
    2045                2050                2055

Ile Leu  Asn Phe Asn Asn Lys  Ile Tyr Tyr Phe Asp  Asp Ser Phe
    2060                2065                2070

Thr Ala  Val Val Gly Trp Lys  Asp Leu Glu Asp Gly  Ser Lys Tyr
    2075                2080                2085

Tyr Phe  Asp Glu Asp Thr Ala  Glu Ala Tyr Ile Gly  Leu Ser Leu
    2090                2095                2100

Ile Asn  Asp Gly Gln Tyr Tyr  Phe Asn Asp Asp Gly  Ile Met Gln
    2105                2110                2115

Val Gly  Phe Val Thr Ile Asn  Asp Lys Val Phe Tyr  Phe Ser Asp
    2120                2125                2130

Ser Gly  Ile Ile Glu Ser Gly  Val Gln Asn Ile Asp  Asp Asn Tyr
    2135                2140                2145

Phe Tyr  Ile Asp Asp Asn Gly  Ile Val Gln Ile Gly  Val Phe Asp
    2150                2155                2160

Thr Ser  Asp Gly Tyr Lys Tyr  Phe Ala Pro Ala Asn  Thr Val Asn
    2165                2170                2175

Asp Asn  Ile Tyr Gly Gln Ala  Val Glu Tyr Ser Gly  Leu Val Arg
    2180                2185                2190

Val Gly  Glu Asp Val Tyr Tyr  Phe Gly Glu Thr Tyr  Thr Ile Glu
    2195                2200                2205
```

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Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile
2225 2230 2235

Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr
2240 2245 2250

Gly Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn
2255 2260 2265

Gly Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe
2270 2275 2280

Tyr Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr
2285 2290 2295

Pro Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu
2300 2305 2310

Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu
2315 2320 2325

Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr
2330 2335 2340

Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp
2345 2350 2355

Thr Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 6
<211> 2366
<212> PRT
<213> Artificial

<220>

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<223> Synthetic amino acid sequence: TcdB (D286A D288A C698A mutations)

<400> 6

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Met Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg
1               5                  10                  15

Phe Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
            20                  25                  30

Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
        35                  40                  45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
    50                  55                  60

Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65                  70                  75                  80

Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys
                85                  90                  95

Asn Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
            100                 105                 110

Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
        115                 120                 125

Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
    130                 135                 140

Val Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145                 150                 155                 160

Leu Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met
                165                 170                 175

Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala
            180                 185                 190
```

```
Gln Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr
        195                 200                 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr
    210                 215                 220

Ile Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val
225                 230                 235                 240

Arg Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu
                245                 250                 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu
            260                 265                 270

Arg Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Ala Val Ala
        275                 280                 285

Met Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro
    290                 295                 300

Ser Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile
305                 310                 315                 320

Met Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp
                325                 330                 335

Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
            340                 345                 350

Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala
        355                 360                 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn
    370                 375                 380

Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val
385                 390                 395                 400
```

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```
Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro
                405                 410                 415

Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile
            420                 425                 430

Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met
        435                 440                 445

Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr
    450                 455                 460

Thr Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp
465                 470                 475                 480

Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala
                485                 490                 495

Asp Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr
            500                 505                 510

Glu Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys
        515                 520                 525

Ala Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly
    530                 535                 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu
545                 550                 555                 560

Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly
                565                 570                 575

Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
            580                 585                 590

Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe
        595                 600                 605
```

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```
Gln Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly
    610                 615                 620

Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile
625                 630                 635                 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp
                645                 650                 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser
            660                 665                 670

Thr Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro
        675                 680                 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser
    690                 695                 700

Ile Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys
705                 710                 715                 720

Asp Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
                725                 730                 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg
            740                 745                 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
        755                 760                 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
    770                 775                 780

Asn Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785                 790                 795                 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu
                805                 810                 815
```

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```
Glu Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
            820                 825                 830

Asp Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr
        835                 840                 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser
    850                 855                 860

Ile Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp
865                 870                 875                 880

Ser His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe
                885                 890                 895

Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
            900                 905                 910

Thr Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu
        915                 920                 925

Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
    930                 935                 940

Val Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn
945                 950                 955                 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu
                965                 970                 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
            980                 985                 990

Leu Phe Ser Thr Gly Leu Asn Thr  Ile Thr Asp Ala Ala  Lys Val Val
        995                 1000                1005

Glu Leu  Val Ser Thr Ala Leu  Asp Glu Thr Ile Asp  Leu Leu Pro
    1010                1015                1020
```

```
Thr Leu  Ser Glu Gly Leu Pro  Ile Ile Ala Thr Ile  Ile Asp Gly
    1025                1030                1035

Val Ser  Leu Gly Ala Ala Ile  Lys Glu Leu Ser Glu  Thr Ser Asp
    1040                1045                1050

Pro Leu  Leu Arg Gln Glu Ile  Glu Ala Lys Ile Gly  Ile Met Ala
    1055                1060                1065

Val Asn  Leu Thr Thr Ala Thr  Thr Ala Ile Ile Thr  Ser Ser Leu
    1070                1075                1080

Gly Ile  Ala Ser Gly Phe Ser  Ile Leu Leu Val Pro  Leu Ala Gly
    1085                1090                1095

Ile Ser  Ala Gly Ile Pro Ser  Leu Val Asn Asn Glu  Leu Val Leu
    1100                1105                1110

Arg Asp  Lys Ala Thr Lys Val  Val Asp Tyr Phe Lys  His Val Ser
    1115                1120                1125

Leu Val  Glu Thr Glu Gly Val  Phe Thr Leu Leu Asp  Asp Lys Ile
    1130                1135                1140

Met Met  Pro Gln Asp Asp Leu  Val Ile Ser Glu Ile  Asp Phe Asn
    1145                1150                1155

Asn Asn  Ser Ile Val Leu Gly  Lys Cys Glu Ile Trp  Arg Met Glu
    1160                1165                1170

Gly Gly  Ser Gly His Thr Val  Thr Asp Asp Ile Asp  His Phe Phe
    1175                1180                1185

Ser Ala  Pro Ser Ile Thr Tyr  Arg Glu Pro His Leu  Ser Ile Tyr
    1190                1195                1200

Asp Val  Leu Glu Val Gln Lys  Glu Glu Leu Asp Leu  Ser Lys Asp
    1205                1210                1215
```

```
Leu Met  Val Leu Pro Asn Ala  Pro Asn Arg Val Phe  Ala Trp Glu
    1220                1225                1230

Thr Gly  Trp Thr Pro Gly Leu  Arg Ser Leu Glu Asn  Asp Gly Thr
    1235                1240                1245

Lys Leu  Leu Asp Arg Ile Arg  Asp Asn Tyr Glu Gly  Glu Phe Tyr
    1250                1255                1260

Trp Arg  Tyr Phe Ala Phe Ile  Ala Asp Ala Leu Ile  Thr Thr Leu
    1265                1270                1275

Lys Pro  Arg Tyr Glu Asp Thr  Asn Ile Arg Ile Asn  Leu Asp Ser
    1280                1285                1290

Asn Thr  Arg Ser Phe Ile Val  Pro Ile Ile Thr Thr  Glu Tyr Ile
    1295                1300                1305

Arg Glu  Lys Leu Ser Tyr Ser  Phe Tyr Gly Ser Gly  Gly Thr Tyr
    1310                1315                1320

Ala Leu  Ser Leu Ser Gln Tyr  Asn Met Gly Ile Asn  Ile Glu Leu
    1325                1330                1335

Ser Glu  Ser Asp Val Trp Ile  Ile Asp Val Asp Asn  Val Val Arg
    1340                1345                1350

Asp Val  Thr Ile Glu Ser Asp  Lys Ile Lys Lys Gly  Asp Leu Ile
    1355                1360                1365

Glu Gly  Ile Leu Ser Thr Leu  Ser Ile Glu Glu Asn  Lys Ile Ile
    1370                1375                1380

Leu Asn  Ser His Glu Ile Asn  Phe Ser Gly Glu Val  Asn Gly Ser
    1385                1390                1395

Asn Gly  Phe Val Ser Leu Thr  Phe Ser Ile Leu Glu  Gly Ile Asn
    1400                1405                1410
```

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```
Ala Ile  Ile Glu Val Asp Leu  Leu Ser Lys Ser Tyr  Lys Leu Leu
    1415                1420                1425

Ile Ser  Gly Glu Leu Lys Ile  Leu Met Leu Asn Ser  Asn His Ile
    1430                1435                1440

Gln Gln  Lys Ile Asp Tyr Ile  Gly Phe Asn Ser Glu  Leu Gln Lys
    1445                1450                1455

Asn Ile  Pro Tyr Ser Phe Val  Asp Ser Glu Gly Lys  Glu Asn Gly
    1460                1465                1470

Phe Ile  Asn Gly Ser Thr Lys  Glu Gly Leu Phe Val  Ser Glu Leu
    1475                1480                1485

Pro Asp  Val Val Leu Ile Ser  Lys Val Tyr Met Asp  Asp Ser Lys
    1490                1495                1500

Pro Ser  Phe Gly Tyr Tyr Ser  Asn Asn Leu Lys Asp  Val Lys Val
    1505                1510                1515

Ile Thr  Lys Asp Asn Val Asn  Ile Leu Thr Gly Tyr  Tyr Leu Lys
    1520                1525                1530

Asp Asp  Ile Lys Ile Ser Leu  Ser Leu Thr Leu Gln  Asp Glu Lys
    1535                1540                1545

Thr Ile  Lys Leu Asn Ser Val  His Leu Asp Glu Ser  Gly Val Ala
    1550                1555                1560

Glu Ile  Leu Lys Phe Met Asn  Arg Lys Gly Asn Thr  Asn Thr Ser
    1565                1570                1575

Asp Ser  Leu Met Ser Phe Leu  Glu Ser Met Asn Ile  Lys Ser Ile
    1580                1585                1590

Phe Val  Asn Phe Leu Gln Ser  Asn Ile Lys Phe Ile  Leu Asp Ala
    1595                1600                1605
```

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```
Asn Phe  Ile Ile Ser Gly Thr  Thr Ser Ile Gly Gln  Phe Glu Phe
    1610                1615                1620

Ile Cys  Asp Glu Asn Asp Asn  Ile Gln Pro Tyr Phe  Ile Lys Phe
    1625                1630                1635

Asn Thr  Leu Glu Thr Asn Tyr  Thr Leu Tyr Val Gly  Asn Arg Gln
    1640                1645                1650

Asn Met  Ile Val Glu Pro Asn  Tyr Asp Leu Asp Asp  Ser Gly Asp
    1655                1660                1665

Ile Ser  Ser Thr Val Ile Asn  Phe Ser Gln Lys Tyr  Leu Tyr Gly
    1670                1675                1680

Ile Asp  Ser Cys Val Asn Lys  Val Val Ile Ser Pro  Asn Ile Tyr
    1685                1690                1695

Thr Asp  Glu Ile Asn Ile Thr  Pro Val Tyr Glu Thr  Asn Asn Thr
    1700                1705                1710

Tyr Pro  Glu Val Ile Val Leu  Asp Ala Asn Tyr Ile  Asn Glu Lys
    1715                1720                1725

Ile Asn  Val Asn Ile Asn Asp  Leu Ser Ile Arg Tyr  Val Trp Ser
    1730                1735                1740

Asn Asp  Gly Asn Asp Phe Ile  Leu Met Ser Thr Ser  Glu Glu Asn
    1745                1750                1755

Lys Val  Ser Gln Val Lys Ile  Arg Phe Val Asn Val  Phe Lys Asp
    1760                1765                1770

Lys Thr  Leu Ala Asn Lys Leu  Ser Phe Asn Phe Ser  Asp Lys Gln
    1775                1780                1785

Asp Val  Pro Val Ser Glu Ile  Ile Leu Ser Phe Thr  Pro Ser Tyr
    1790                1795                1800
```

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```
Tyr Glu  Asp Gly Leu Ile Gly  Tyr Asp Leu Gly Leu  Val Ser Leu
    1805                1810                1815

Tyr Asn  Glu Lys Phe Tyr Ile  Asn Asn Phe Gly Met  Met Val Ser
    1820                1825                1830

Gly Leu  Ile Tyr Ile Asn Asp  Ser Leu Tyr Tyr Phe  Lys Pro Pro
    1835                1840                1845

Val Asn  Asn Leu Ile Thr Gly  Phe Val Thr Val Gly  Asp Asp Lys
    1850                1855                1860

Tyr Tyr  Phe Asn Pro Ile Asn  Gly Gly Ala Ala Ser  Ile Gly Glu
    1865                1870                1875

Thr Ile  Ile Asp Asp Lys Asn  Tyr Tyr Phe Asn Gln  Ser Gly Val
    1880                1885                1890

Leu Gln  Thr Gly Val Phe Ser  Thr Glu Asp Gly Phe  Lys Tyr Phe
    1895                1900                1905

Ala Pro  Ala Asn Thr Leu Asp  Glu Asn Leu Glu Gly  Glu Ala Ile
    1910                1915                1920

Asp Phe  Thr Gly Lys Leu Ile  Ile Asp Glu Asn Ile  Tyr Tyr Phe
    1925                1930                1935

Asp Asp  Asn Tyr Arg Gly Ala  Val Glu Trp Lys Glu  Leu Asp Gly
    1940                1945                1950

Glu Met  His Tyr Phe Ser Pro  Glu Thr Gly Lys Ala  Phe Lys Gly
    1955                1960                1965

Leu Asn  Gln Ile Gly Asp Tyr  Lys Tyr Tyr Phe Asn  Ser Asp Gly
    1970                1975                1980

Val Met  Gln Lys Gly Phe Val  Ser Ile Asn Asp Asn  Lys His Tyr
    1985                1990                1995
```

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```
Phe Asp  Asp Ser Gly Val Met  Lys Val Gly Tyr Thr  Glu Ile Asp
    2000                2005                2010

Gly Lys  His Phe Tyr Phe Ala  Glu Asn Gly Glu Met  Gln Ile Gly
    2015                2020                2025

Val Phe  Asn Thr Glu Asp Gly  Phe Lys Tyr Phe Ala  His His Asn
    2030                2035                2040

Glu Asp  Leu Gly Asn Glu Glu  Gly Glu Glu Ile Ser  Tyr Ser Gly
    2045                2050                2055

Ile Leu  Asn Phe Asn Asn Lys  Ile Tyr Tyr Phe Asp  Asp Ser Phe
    2060                2065                2070

Thr Ala  Val Val Gly Trp Lys  Asp Leu Glu Asp Gly  Ser Lys Tyr
    2075                2080                2085

Tyr Phe  Asp Glu Asp Thr Ala  Glu Ala Tyr Ile Gly  Leu Ser Leu
    2090                2095                2100

Ile Asn  Asp Gly Gln Tyr Tyr  Phe Asn Asp Asp Gly  Ile Met Gln
    2105                2110                2115

Val Gly  Phe Val Thr Ile Asn  Asp Lys Val Phe Tyr  Phe Ser Asp
    2120                2125                2130

Ser Gly  Ile Ile Glu Ser Gly  Val Gln Asn Ile Asp  Asp Asn Tyr
    2135                2140                2145

Phe Tyr  Ile Asp Asp Asn Gly  Ile Val Gln Ile Gly  Val Phe Asp
    2150                2155                2160

Thr Ser  Asp Gly Tyr Lys Tyr  Phe Ala Pro Ala Asn  Thr Val Asn
    2165                2170                2175

Asp Asn  Ile Tyr Gly Gln Ala  Val Glu Tyr Ser Gly  Leu Val Arg
    2180                2185                2190
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Val Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu
2195 2200 2205

Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile
2225 2230 2235

Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr
2240 2245 2250

Gly Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn
2255 2260 2265

Gly Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe
2270 2275 2280

Tyr Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr
2285 2290 2295

Pro Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu
2300 2305 2310

Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu
2315 2320 2325

Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr
2330 2335 2340

Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp
2345 2350 2355

Thr Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 7
<211> 2710
<212> PRT
<213> Artificial

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<223> Synthetic amino acid sequence: TcdA (D269A, R272A, D285A, D287A, E460A, R462A, and C700A mutations)

<400> 7

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Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
            20                  25                  30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
        35                  40                  45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr
    50                  55                  60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65                  70                  75                  80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
            100                 105                 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
        115                 120                 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
    130                 135                 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
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            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Ala Ile Val Ala
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
    290                 295                 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
                325                 330                 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
            340                 345                 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
        355                 360                 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
    370                 375                 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
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385 390 395 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
405 410 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
420 425 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
435 440 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Ala Ala Ala Ser Thr
450 455 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465 470 475 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
485 490 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
500 505 510

Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
515 520 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
530 535 540

Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545 550 555 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
565 570 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
580 585 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile

595 600 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
610 615 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625 630 635 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
645 650 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
660 665 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
675 680 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser
690 695 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705 710 715 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser
725 730 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
740 745 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
755 760 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
770 775 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785 790 795 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser

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805 810 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
820 825 830

Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
835 840 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
850 855 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865 870 875 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
885 890 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
900 905 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
915 920 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
930 935 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945 950 955 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
965 970 975

Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
980 985 990

Ala Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln
995 1000 1005

Leu Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val

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1010                1015                1020

Leu Pro  Thr Ile Thr Glu Gly  Ile Pro Ile Val Ser  Thr Ile Leu
1025                1030                1035

Asp Gly  Ile Asn Leu Gly Ala  Ala Ile Lys Glu Leu  Leu Asp Glu
1040                1045                1050

His Asp  Pro Leu Leu Lys Lys  Glu Leu Glu Ala Lys  Val Gly Val
1055                1060                1065

Leu Ala  Ile Asn Met Ser Leu  Ser Ile Ala Ala Thr  Val Ala Ser
1070                1075                1080

Ile Val  Gly Ile Gly Ala Glu  Val Thr Ile Phe Leu  Leu Pro Ile
1085                1090                1095

Ala Gly  Ile Ser Ala Gly Ile  Pro Ser Leu Val Asn  Asn Glu Leu
1100                1105                1110

Ile Leu  His Asp Lys Ala Thr  Ser Val Val Asn Tyr  Phe Asn His
1115                1120                1125

Leu Ser  Glu Ser Lys Lys Tyr  Gly Pro Leu Lys Thr  Glu Asp Asp
1130                1135                1140

Lys Ile  Leu Val Pro Ile Asp  Asp Leu Val Ile Ser  Glu Ile Asp
1145                1150                1155

Phe Asn  Asn Asn Ser Ile Lys  Leu Gly Thr Cys Asn  Ile Leu Ala
1160                1165                1170

Met Glu  Gly Gly Ser Gly His  Thr Val Thr Gly Asn  Ile Asp His
1175                1180                1185

Phe Phe  Ser Ser Pro Ser Ile  Ser Ser His Ile Pro  Ser Leu Ser
1190                1195                1200

Ile Tyr  Ser Ala Ile Gly Ile  Glu Thr Glu Asn Leu  Asp Phe Ser
```

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1205 1210 1215

Lys Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp
1220 1225 1230

Trp Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp
1235 1240 1245

Gly Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys
1250 1255 1260

Phe Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr
1265 1270 1275

Leu Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp
1280 1285 1290

Lys Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu
1295 1300 1305

Ile Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr
1310 1315 1320

Tyr Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn
1325 1330 1335

Leu Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val
1340 1345 1350

Arg Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu
1355 1360 1365

Ile Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu
1370 1375 1380

Ile Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn
1385 1390 1395

Lys Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile

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1400 1405 1410

Ser Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu
1415 1420 1425

Leu Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn
1430 1435 1440

Ile Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile
1445 1450 1455

Ala Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala
1460 1465 1470

Ile Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp
1475 1480 1485

Ser Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe
1490 1495 1500

Asn Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys
1505 1510 1515

Asp Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn
1520 1525 1530

Thr Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn
1535 1540 1545

Gln Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser
1550 1555 1560

Ser Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr
1565 1570 1575

Ser Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys
1580 1585 1590

Leu Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe

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1595 1600 1605

Thr Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys
1610 1615 1620

Asp Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr
1625 1630 1635

Ser Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val
1640 1645 1650

Val Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser
1655 1660 1665

Thr Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg
1670 1675 1680

Tyr Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu
1685 1690 1695

Ile Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu
1700 1705 1710

Ile Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile
1715 1720 1725

Asn Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly
1730 1735 1740

Ser Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys
1745 1750 1755

Ile Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln
1760 1765 1770

Ser Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu
1775 1780 1785

Ser Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu

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1790 1795 1800

Asn Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn
1805 1810 1815

Lys Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu
1820 1825 1830

Ile Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe
1835 1840 1845

Asn Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr
1850 1855 1860

Phe Asp Ile Asn Thr Gly Ala Ala Leu Ile Ser Tyr Lys Ile Ile
1865 1870 1875

Asn Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu
1880 1885 1890

Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala
1895 1900 1905

Asn Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln
1910 1915 1920

Ser Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn
1925 1930 1935

Asp Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys
1940 1945 1950

Tyr Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln
1955 1960 1965

Val Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile
1970 1975 1980

Ile Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe

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1985 1990 1995

Asp Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp
2000 2005 2010

Gly Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly
2015 2020 2025

Val Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2030 2035 2040

Thr Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
2045 2050 2055

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
2060 2065 2070

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr
2075 2080 2085

Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr
2090 2095 2100

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala
2105 2110 2115

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2120 2125 2130

Thr Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
2135 2140 2145

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2150 2155 2160

Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2165 2170 2175

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu

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2180 2185 2190

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser
2195 2200 2205

Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile
2225 2230 2235

Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn
2240 2245 2250

Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn
2255 2260 2265

Asn Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly
2270 2275 2280

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu
2285 2290 2295

Gly Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly
2300 2305 2310

Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp
2315 2320 2325

Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala
2330 2335 2340

Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr
2345 2350 2355

Phe Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2360 2365 2370

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser

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2375 2380 2385

Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr
2390 2395 2400

Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe
2405 2410 2415

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2420 2425 2430

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2435 2440 2445

Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg
2450 2455 2460

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val
2465 2470 2475

Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
2480 2485 2490

Asn Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser
2495 2500 2505

Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly
2510 2515 2520

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2525 2530 2535

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2540 2545 2550

Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn
2555 2560 2565

Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr

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2570 2575 2580

Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr
2585 2590 2595

Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile
2600 2605 2610

Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala
2615 2620 2625

Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln
2630 2635 2640

Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly
2705 2710

<210> 8
<211> 2366
<212> PRT
<213> Artificial

<220>
<223> Synthetic amino acid sequence: TcdB (D270A, R273A, D286A, D288A, D461A, K463A, and C698A mutations)

<400> 8

Met Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg
1 5 10 15

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Phe Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
            20                  25                  30

Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
        35                  40                  45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
    50                  55                  60

Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65                  70                  75                  80

Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys
                85                  90                  95

Asn Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
            100                 105                 110

Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
        115                 120                 125

Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
    130                 135                 140

Val Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145                 150                 155                 160

Leu Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met
                165                 170                 175

Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala
            180                 185                 190

Gln Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr
        195                 200                 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr
    210                 215                 220
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```
Ile Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val
225                 230                 235                 240

Arg Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu
                245                 250                 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Ala Ile Leu
            260                 265                 270

Ala Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Ala Val Ala
        275                 280                 285

Met Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro
    290                 295                 300

Ser Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile
305                 310                 315                 320

Met Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp
                325                 330                 335

Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
            340                 345                 350

Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala
        355                 360                 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn
    370                 375                 380

Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val
385                 390                 395                 400

Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro
                405                 410                 415

Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile
            420                 425                 430
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```
Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met
        435                 440                 445

Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Ala Val Ala Thr
    450                 455                 460

Thr Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp
465                 470                 475                 480

Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala
                485                 490                 495

Asp Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr
            500                 505                 510

Glu Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys
        515                 520                 525

Ala Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly
    530                 535                 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu
545                 550                 555                 560

Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly
                565                 570                 575

Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
            580                 585                 590

Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe
        595                 600                 605

Gln Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly
    610                 615                 620

Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile
625                 630                 635                 640
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```
Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp
                645                 650                 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser
            660                 665                 670

Thr Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro
        675                 680                 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser
    690                 695                 700

Ile Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys
705                 710                 715                 720

Asp Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
                725                 730                 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg
            740                 745                 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
        755                 760                 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
    770                 775                 780

Asn Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785                 790                 795                 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu
                805                 810                 815

Glu Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
            820                 825                 830

Asp Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr
        835                 840                 845
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```
Ser Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser
    850                 855                 860

Ile Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp
865                 870                 875                 880

Ser His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe
                885                 890                 895

Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
            900                 905                 910

Thr Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu
        915                 920                 925

Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
    930                 935                 940

Val Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn
945                 950                 955                 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu
                965                 970                 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
            980                 985                 990

Leu Phe Ser Thr Gly Leu Asn Thr  Ile Thr Asp Ala Ala  Lys Val Val
        995                 1000                1005

Glu Leu  Val Ser Thr Ala Leu  Asp Glu Thr Ile Asp  Leu Leu Pro
    1010                1015                1020

Thr Leu  Ser Glu Gly Leu Pro  Ile Ile Ala Thr Ile  Ile Asp Gly
    1025                1030                1035

Val Ser  Leu Gly Ala Ala Ile  Lys Glu Leu Ser Glu  Thr Ser Asp
    1040                1045                1050
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Pro Leu  Leu Arg Gln Glu Ile  Glu Ala Lys Ile Gly  Ile Met Ala
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Gly Ile  Ala Ser Gly Phe Ser  Ile Leu Leu Val Pro  Leu Ala Gly
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Glu Gly  Ile Leu Ser Thr Leu  Ser Ile Glu Glu Asn  Lys Ile Ile
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Leu Asn  Ser His Glu Ile Asn  Phe Ser Gly Glu Val  Asn Gly Ser
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Ile Ser  Gly Glu Leu Lys Ile  Leu Met Leu Asn Ser  Asn His Ile
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Tyr Tyr  Phe Asn Pro Ile Asn  Gly Gly Ala Ala Ser  Ile Gly Glu
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Thr Ile  Ile Asp Asp Lys Asn  Tyr Tyr Phe Asn Gln  Ser Gly Val
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Leu Gln  Thr Gly Val Phe Ser  Thr Glu Asp Gly Phe  Lys Tyr Phe
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Asp Phe  Thr Gly Lys Leu Ile  Ile Asp Glu Asn Ile  Tyr Tyr Phe
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Asp Asp  Asn Tyr Arg Gly Ala  Val Glu Trp Lys Glu  Leu Asp Gly
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Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
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Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
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Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
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Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
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Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
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Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Pro Arg Pro Ser
    290                 295                 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
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Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
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Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
    370                 375                 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385                 390                 395                 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
                405                 410                 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
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Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
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Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
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Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
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Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
                485                 490                 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
            500                 505                 510

Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
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Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
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                565                 570                 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
            580                 585                 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
        595                 600                 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
    610                 615                 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625                 630                 635                 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
                645                 650                 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
            660                 665                 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
        675                 680                 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
    690                 695                 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
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Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser
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Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
            740                 745                 750
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785                 790                 795                 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
                805                 810                 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
            820                 825                 830

Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
        835                 840                 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
    850                 855                 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
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Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
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            900                 905                 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
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Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
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Ala Gln Leu Phe Ser Thr Gly Leu  Asn Thr Ile Tyr Asp  Ser Ile Gln
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Leu Pro  Thr Ile Thr Glu Gly  Ile Pro Ile Val Ser  Thr Ile Leu
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Asp Gly  Ile Asn Leu Gly Ala  Ala Ile Lys Glu Leu  Leu Asp Glu
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His Asp  Pro Leu Leu Lys Lys  Glu Leu Glu Ala Lys  Val Gly Val
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Leu Ala  Ile Asn Met Ser Leu  Ser Ile Ala Ala Thr  Val Ala Ser
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Ile Val  Gly Ile Gly Ala Glu  Val Thr Ile Phe Leu  Leu Pro Ile
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Ala Gly  Ile Ser Ala Gly Ile  Pro Ser Leu Val Asn  Asn Glu Leu
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Ile Leu  His Asp Lys Ala Thr  Ser Val Val Asn Tyr  Phe Asn His
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Lys Ile  Leu Val Pro Ile Asp  Asp Leu Val Ile Ser  Glu Ile Asp
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Val Tyr  Ser Ala Ile Gly Ile  Lys Thr Glu Asn Leu  Asp Phe Ser
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Lys Lys  Ile Met Met Leu Pro  Asn Ala Pro Ser Arg  Val Phe Trp
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Lys Asp  Thr Arg Asn Phe Ile  Met Pro Thr Ile Thr  Thr Asp Glu
    1295                1300                1305

Ile Arg  Asn Lys Leu Ser Tyr  Ser Phe Asp Gly Ala  Gly Gly Thr
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Tyr Ser  Leu Leu Leu Ser Ser  Tyr Pro Ile Ser Met  Asn Ile Asn
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Arg Glu  Ile Ser Ile Glu Asn  Gly Thr Ile Lys Lys  Gly Asn Leu
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Ile Glu  Asp Val Leu Ser Lys  Ile Asp Ile Asn Lys  Asn Lys Leu
    1370                1375                1380

Ile Ile  Gly Asn Gln Thr Ile  Asp Phe Ser Gly Asp  Ile Asp Asn
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Lys Asp  Arg Tyr Ile Phe Leu  Thr Cys Glu Leu Asp  Asp Lys Ile
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Ser Leu  Ile Ile Glu Ile Asn  Leu Val Ala Lys Ser  Tyr Ser Leu
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Leu Leu  Ser Gly Asp Lys Asn  Tyr Leu Ile Ser Asn  Leu Ser Asn
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Thr Ile  Glu Lys Ile Asn Thr  Leu Gly Leu Asp Ser  Lys Asn Ile
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Ala Tyr  Asn Tyr Thr Asp Glu  Ser Asn Asn Lys Tyr  Phe Gly Ala
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Ile Ser  Lys Thr Ser Gln Lys  Ser Ile Ile His Tyr  Lys Lys Asp
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Ser Lys  Asn Ile Leu Glu Phe  Tyr Asn Gly Ser Thr  Leu Glu Phe
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Asp Asp  Ile Asn Thr Ile Thr  Gly Lys Tyr Tyr Val  Asp Asn Asn
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Thr Asp  Lys Ser Ile Asp Phe  Ser Ile Ser Leu Val  Ser Lys Asn
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Gln Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser
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Ser Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr
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Ser Asn Phe Met Asn Leu Phe Leu Asn Asn Ile Ser Phe Trp Lys
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Leu Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe
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Thr Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys
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Asp Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr
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Ser Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val
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Val Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser
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Thr Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg
1670 1675 1680

Tyr Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu
1685 1690 1695

Ile Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu
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Ile Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile
1715 1720 1725

Asn Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly
1730 1735 1740

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Ser Asp  Phe Ile Leu Val Arg  Tyr Leu Glu Glu Ser  Asn Lys Lys
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Ile Leu  Gln Lys Ile Arg Ile  Lys Gly Ile Leu Ser  Asn Thr Gln
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Ser Phe  Asn Lys Met Ser Ile  Asp Phe Lys Asp Ile  Lys Lys Leu
    1775                1780                1785

Ser Leu  Gly Tyr Ile Met Ser  Asn Phe Lys Ser Phe  Asn Ser Glu
    1790                1795                1800

Asn Glu  Leu Asp Arg Asp His  Leu Gly Phe Lys Ile  Ile Asp Asn
    1805                1810                1815

Lys Thr  Tyr Tyr Tyr Asp Glu  Asp Ser Lys Leu Val  Lys Gly Leu
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Ile Asn  Ile Asn Asn Ser Leu  Phe Tyr Phe Asp Pro  Ile Glu Ser
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Asn Leu  Val Thr Gly Trp Gln  Thr Ile Asn Gly Lys  Lys Tyr Tyr
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Phe Asp  Ile Asn Thr Gly Ala  Ala Ser Thr Ser Tyr  Lys Ile Ile
    1865                1870                1875

Asn Gly  Lys His Phe Tyr Phe  Asn Asn Asn Gly Val  Met Gln Leu
    1880                1885                1890

Gly Val  Phe Lys Gly Pro Asp  Gly Phe Glu Tyr Phe  Ala Pro Ala
    1895                1900                1905

Asn Thr  Gln Asn Asn Asn Ile  Glu Gly Gln Ala Ile  Val Tyr Gln
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Ser Lys  Phe Leu Thr Leu Asn  Gly Lys Lys Tyr Tyr  Phe Asp Asn
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Asp Ser  Lys Ala Val Thr Gly  Trp Arg Ile Ile Asn  Asn Glu Lys
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Tyr Tyr  Phe Asn Pro Asn Asn  Ala Ile Ala Ala Val  Gly Leu Gln
    1955                1960                1965

Val Ile  Asp Asn Asn Lys Tyr  Tyr Phe Asn Pro Asp  Thr Ala Ile
    1970                1975                1980

Ile Ser  Lys Gly Trp Gln Thr  Val Asn Gly Ser Arg  Tyr Tyr Phe
    1985                1990                1995

Asp Thr  Asp Thr Ala Ile Ala  Phe Asn Gly Tyr Lys  Thr Ile Asp
    2000                2005                2010

Gly Lys  His Phe Tyr Phe Asp  Ser Asp Cys Val Val  Lys Ile Gly
    2015                2020                2025

Val Phe  Ser Gly Ser Asn Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
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Thr Tyr  Asn Asn Asn Ile Glu  Gly Gln Ala Ile Val  Tyr Gln Ser
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Lys Phe  Leu Thr Leu Asn Gly  Lys Lys Tyr Tyr Phe  Asp Asn Asn
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Ser Lys  Ala Val Thr Gly Trp  Gln Thr Ile Asp Ser  Lys Lys Tyr
    2075                2080                2085

Tyr Phe  Asn Thr Asn Thr Ala  Glu Ala Ala Thr Gly  Trp Gln Thr
    2090                2095                2100

Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr Asn Thr  Ala Glu Ala
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Ala Thr  Gly Trp Gln Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn
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Thr Asn  Thr Ser Ile Ala Ser  Thr Gly Tyr Thr Ile  Ile Asn Gly
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Lys Tyr  Phe Tyr Phe Asn Thr  Asp Gly Ile Met Gln  Ile Gly Val
    2150                2155                2160

Phe Lys  Val Pro Asn Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr
    2165                2170                2175

His Asn  Asn Asn Ile Glu Gly  Gln Ala Ile Leu Tyr  Gln Asn Lys
    2180                2185                2190

Phe Leu  Thr Leu Asn Gly Lys  Lys Tyr Tyr Phe Gly  Ser Asp Ser
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Lys Ala  Ile Thr Gly Trp Gln  Thr Ile Asp Gly Lys  Lys Tyr Tyr
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Phe Asn  Pro Asn Asn Ala Ile  Ala Ala Thr His Leu  Cys Thr Ile
    2225                2230                2235

Asn Asn  Asp Lys Tyr Tyr Phe  Ser Tyr Asp Gly Ile  Leu Gln Asn
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Gly Tyr  Ile Thr Ile Glu Arg  Asn Asn Phe Tyr Phe  Asp Ala Asn
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Asn Glu  Ser Lys Met Val Thr  Gly Val Phe Lys Gly  Pro Asn Gly
    2270                2275                2280

Phe Glu  Tyr Phe Ala Pro Ala  Asn Thr His Asn Asn  Asn Ile Glu
    2285                2290                2295

Gly Gln  Ala Ile Val Tyr Gln  Asn Lys Phe Leu Thr  Leu Asn Gly
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Lys Lys  Tyr Tyr Phe Asp Asn  Asp Ser Lys Ala Val  Thr Gly Trp
    2315                2320                2325
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Gln Thr  Ile Asp Ser Lys Lys  Tyr Tyr Phe Asn Leu  Asn Thr Ala
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Val Ala  Val Thr Gly Trp Gln  Thr Ile Asp Gly Glu  Lys Tyr Tyr
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Phe Asn  Leu Asn Thr Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile
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Asp Gly  Lys Arg Tyr Tyr Phe  Asn Thr Asn Thr Tyr  Ile Ala Ser
    2375                2380                2385

Thr Gly  Tyr Thr Ile Ile Asn  Gly Lys His Phe Tyr  Phe Asn Thr
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Asp Gly  Ile Met Gln Ile Gly  Val Phe Lys Gly Pro  Asp Gly Phe
    2405                2410                2415

Glu Tyr  Phe Ala Pro Ala Asn  Thr His Asn Asn Asn  Ile Glu Gly
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Gln Ala  Ile Leu Tyr Gln Asn  Lys Phe Leu Thr Leu  Asn Gly Lys
    2435                2440                2445

Lys Tyr  Tyr Phe Gly Ser Asp  Ser Lys Ala Val Thr  Gly Leu Arg
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Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn Thr Asn  Thr Ala Val
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Ala Val  Thr Gly Trp Gln Thr  Ile Asn Gly Lys Lys  Tyr Tyr Phe
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Asn Thr  Asn Thr Tyr Ile Ala  Ser Thr Gly Tyr Thr  Ile Ile Ser
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Gly Lys  His Phe Tyr Phe Asn  Thr Asp Gly Ile Met  Gln Ile Gly
    2510                2515                2520
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Val Phe  Lys Gly Pro Asp Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
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Thr Asp  Ala Asn Asn Ile Glu  Gly Gln Ala Ile Arg  Tyr Gln Asn
    2540                2545                2550

Arg Phe  Leu Tyr Leu His Asp  Asn Ile Tyr Tyr Phe  Gly Asn Asp
    2555                2560                2565

Ser Lys  Ala Ala Thr Gly Trp  Ala Thr Ile Asp Gly  Asn Arg Tyr
    2570                2575                2580

Tyr Phe  Glu Pro Asn Thr Ala  Met Gly Ala Asn Gly  Tyr Lys Thr
    2585                2590                2595

Ile Asp  Asn Lys Asn Phe Tyr  Phe Arg Asn Gly Leu  Pro Gln Ile
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Gly Val  Phe Lys Gly Pro Asn  Gly Phe Glu Tyr Phe  Ala Pro Ala
    2615                2620                2625

Asn Thr  Asp Ala Asn Asn Ile  Asp Gly Gln Ala Ile  Arg Tyr Gln
    2630                2635                2640

Asn Arg  Phe Leu His Leu Leu  Gly Lys Ile Tyr Tyr  Phe Gly Asn
    2645                2650                2655

Asn Ser  Lys Ala Val Thr Gly  Trp Gln Thr Ile Asn  Ser Lys Val
    2660                2665                2670

Tyr Tyr  Phe Met Pro Asp Thr  Ala Met Ala Ala Ala  Gly Gly Leu
    2675                2680                2685

Phe Glu  Ile Asp Gly Val Ile  Tyr Phe Phe Gly Val  Asp Gly Val
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Lys Ala  Pro Gly Ile Tyr Gly
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Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
35 40 45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn
50 55 60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65 70 75 80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
85 90 95

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Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
            100                 105                 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
        115                 120                 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
    130                 135                 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Pro Arg Pro Ser
    290                 295                 300
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```
Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
                325                 330                 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
            340                 345                 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
        355                 360                 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
    370                 375                 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385                 390                 395                 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
                405                 410                 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
            420                 425                 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
        435                 440                 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
    450                 455                 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465                 470                 475                 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
                485                 490                 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
            500                 505                 510
```

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```
Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
        515                 520                 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
    530                 535                 540

Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545                 550                 555                 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
                565                 570                 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
            580                 585                 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
        595                 600                 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
    610                 615                 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625                 630                 635                 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
                645                 650                 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
            660                 665                 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
        675                 680                 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
    690                 695                 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705                 710                 715                 720
```

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```
Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser
                725                 730                 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
            740                 745                 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
        755                 760                 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
    770                 775                 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785                 790                 795                 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
                805                 810                 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
            820                 825                 830

Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
        835                 840                 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
    850                 855                 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865                 870                 875                 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
                885                 890                 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
            900                 905                 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
        915                 920                 925
```

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```
Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
    930                 935                 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945                 950                 955                 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
                965                 970                 975

Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
            980                 985                 990

Ala Gln Leu Phe Ser Thr Gly Leu  Asn Thr Ile Tyr Asp  Ser Ile Gln
        995                 1000                1005

Leu Val  Asn Leu Ile Ser Asn  Ala Val Asn Asp Thr  Ile Asn Val
    1010                1015                1020

Leu Pro  Thr Ile Thr Glu Gly  Ile Pro Ile Val Ser  Thr Ile Leu
    1025                1030                1035

Asp Gly  Ile Asn Leu Gly Ala  Ala Ile Lys Glu Leu  Leu Asp Glu
    1040                1045                1050

His Asp  Pro Leu Leu Lys Lys  Glu Leu Glu Ala Lys  Val Gly Val
    1055                1060                1065

Leu Ala  Ile Asn Met Ser Leu  Ser Ile Ala Ala Thr  Val Ala Ser
    1070                1075                1080

Ile Val  Gly Ile Gly Ala Glu  Val Thr Ile Phe Leu  Leu Pro Ile
    1085                1090                1095

Ala Gly  Ile Ser Ala Gly Ile  Pro Ser Leu Val Asn  Asn Glu Leu
    1100                1105                1110

Ile Leu  His Asp Lys Ala Thr  Ser Val Val Asn Tyr  Phe Asn His
    1115                1120                1125
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```
Leu Ser  Glu Ser Lys Glu Tyr  Gly Pro Leu Lys Thr  Glu Asp Asp
    1130                1135                1140

Lys Ile  Leu Val Pro Ile Asp  Asp Leu Val Ile Ser  Glu Ile Asp
    1145                1150                1155

Phe Asn  Asn Asn Ser Ile Lys  Leu Gly Thr Cys Asn  Ile Leu Ala
    1160                1165                1170

Met Glu  Gly Gly Ser Gly His  Thr Val Thr Gly Asn  Ile Asp His
    1175                1180                1185

Phe Phe  Ser Ser Pro Tyr Ile  Ser Ser His Ile Pro  Ser Leu Ser
    1190                1195                1200

Val Tyr  Ser Ala Ile Gly Ile  Lys Thr Glu Asn Leu  Asp Phe Ser
    1205                1210                1215

Lys Lys  Ile Met Met Leu Pro  Asn Ala Pro Ser Arg  Val Phe Trp
    1220                1225                1230

Trp Glu  Thr Gly Ala Val Pro  Gly Leu Arg Ser Leu  Glu Asn Asn
    1235                1240                1245

Gly Thr  Lys Leu Leu Asp Ser  Ile Arg Asp Leu Tyr  Pro Gly Lys
    1250                1255                1260

Phe Tyr  Trp Arg Phe Tyr Ala  Phe Phe Asp Tyr Ala  Ile Thr Thr
    1265                1270                1275

Leu Lys  Pro Val Tyr Glu Asp  Thr Asn Thr Lys Ile  Lys Leu Asp
    1280                1285                1290

Lys Asp  Thr Arg Asn Phe Ile  Met Pro Thr Ile Thr  Thr Asp Glu
    1295                1300                1305

Ile Arg  Asn Lys Leu Ser Tyr  Ser Phe Asp Gly Ala  Gly Gly Thr
    1310                1315                1320
```

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```
Tyr Ser  Leu Leu Leu Ser Ser  Tyr Pro Ile Ser Met  Asn Ile Asn
    1325                1330                1335

Leu Ser  Lys Asp Asp Leu Trp  Ile Phe Asn Ile Asp  Asn Glu Val
    1340                1345                1350

Arg Glu  Ile Ser Ile Glu Asn  Gly Thr Ile Lys Lys  Gly Asn Leu
    1355                1360                1365

Ile Glu  Asp Val Leu Ser Lys  Ile Asp Ile Asn Lys  Asn Lys Leu
    1370                1375                1380

Ile Ile  Gly Asn Gln Thr Ile  Asp Phe Ser Gly Asp  Ile Asp Asn
    1385                1390                1395

Lys Asp  Arg Tyr Ile Phe Leu  Thr Cys Glu Leu Asp  Asp Lys Ile
    1400                1405                1410

Ser Leu  Ile Ile Glu Ile Asn  Leu Val Ala Lys Ser  Tyr Ser Leu
    1415                1420                1425

Leu Leu  Ser Gly Asp Lys Asn  Tyr Leu Ile Ser Asn  Leu Ser Asn
    1430                1435                1440

Thr Ile  Glu Lys Ile Asn Thr  Leu Gly Leu Asp Ser  Lys Asn Ile
    1445                1450                1455

Ala Tyr  Asn Tyr Thr Asp Glu  Ser Asn Asn Lys Tyr  Phe Gly Ala
    1460                1465                1470

Ile Ser  Lys Thr Ser Gln Lys  Ser Ile Ile His Tyr  Lys Lys Asp
    1475                1480                1485

Ser Lys  Asn Ile Leu Glu Phe  Tyr Asn Gly Ser Thr  Leu Glu Phe
    1490                1495                1500

Asn Ser  Lys Asp Phe Ile Ala  Glu Asp Ile Asn Val  Phe Met Lys
    1505                1510                1515
```

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```
Asp Asp  Ile Asn Thr Ile Thr  Gly Lys Tyr Tyr Val  Asp Asn Asn
    1520                1525                1530

Thr Asp  Lys Ser Ile Asp Phe  Ser Ile Ser Leu Val  Ser Lys Asn
    1535                1540                1545

Gln Val  Lys Val Asn Gly Leu  Tyr Leu Asn Glu Ser  Val Tyr Ser
    1550                1555                1560

Ser Tyr  Leu Asp Phe Val Lys  Asn Ser Asp Gly His  His Asn Thr
    1565                1570                1575

Ser Asn  Phe Met Asn Leu Phe  Leu Asn Asn Ile Ser  Phe Trp Lys
    1580                1585                1590

Leu Phe  Gly Phe Glu Asn Ile  Asn Phe Val Ile Asp  Lys Tyr Phe
    1595                1600                1605

Thr Leu  Val Gly Lys Thr Asn  Leu Gly Tyr Val Glu  Phe Ile Cys
    1610                1615                1620

Asp Asn  Asn Lys Asn Ile Asp  Ile Tyr Phe Gly Glu  Trp Lys Thr
    1625                1630                1635

Ser Ser  Ser Lys Ser Thr Ile  Phe Ser Gly Asn Gly  Arg Asn Val
    1640                1645                1650

Val Val  Glu Pro Ile Tyr Asn  Pro Asp Thr Gly Glu  Asp Ile Ser
    1655                1660                1665

Thr Ser  Leu Asp Phe Ser Tyr  Glu Pro Leu Tyr Gly  Ile Asp Arg
    1670                1675                1680

Tyr Ile  Asn Lys Val Leu Ile  Ala Pro Asp Leu Tyr  Thr Ser Leu
    1685                1690                1695

Ile Asn  Ile Asn Thr Asn Tyr  Tyr Ser Asn Glu Tyr  Tyr Pro Glu
    1700                1705                1710
```

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```
Ile Ile  Val Leu Asn Pro Asn  Thr Phe His Lys Lys  Val Asn Ile
    1715                1720                1725

Asn Leu  Asp Ser Ser Ser Phe  Glu Tyr Lys Trp Ser  Thr Glu Gly
    1730                1735                1740

Ser Asp  Phe Ile Leu Val Arg  Tyr Leu Glu Glu Ser  Asn Lys Lys
    1745                1750                1755

Ile Leu  Gln Lys Ile Arg Ile  Lys Gly Ile Leu Ser  Asn Thr Gln
    1760                1765                1770

Ser Phe  Asn Lys Met Ser Ile  Asp Phe Lys Asp Ile  Lys Lys Leu
    1775                1780                1785

Ser Leu  Gly Tyr Ile Met Ser  Asn Phe Lys Ser Phe  Asn Ser Glu
    1790                1795                1800

Asn Glu  Leu Asp Arg Asp His  Leu Gly Phe Lys Ile  Ile Asp Asn
    1805                1810                1815

Lys Thr  Tyr Tyr Tyr Asp Glu  Asp Ser Lys Leu Val  Lys Gly Leu
    1820                1825                1830

Ile Asn  Ile Asn Asn Ser Leu  Phe Tyr Phe Asp Pro  Ile Glu Ser
    1835                1840                1845

Asn Leu  Val Thr Gly Trp Gln  Thr Ile Asn Gly Lys  Lys Tyr Tyr
    1850                1855                1860

Phe Asp  Ile Asn Thr Gly Ala  Ala Ser Thr Ser Tyr  Lys Ile Ile
    1865                1870                1875

Asn Gly  Lys His Phe Tyr Phe  Asn Asn Asn Gly Val  Met Gln Leu
    1880                1885                1890

Gly Val  Phe Lys Gly Pro Asp  Gly Phe Glu Tyr Phe  Ala Pro Ala
    1895                1900                1905
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```
Asn Thr  Gln Asn Asn Asn Ile  Glu Gly Gln Ala Ile  Val Tyr Gln
    1910                1915                1920

Ser Lys  Phe Leu Thr Leu Asn  Gly Lys Lys Tyr Tyr  Phe Asp Asn
    1925                1930                1935

Asp Ser  Lys Ala Val Thr Gly  Trp Arg Ile Ile Asn  Asn Glu Lys
    1940                1945                1950

Tyr Tyr  Phe Asn Pro Asn Asn  Ala Ile Ala Ala Val  Gly Leu Gln
    1955                1960                1965

Val Ile  Asp Asn Asn Lys Tyr  Tyr Phe Asn Pro Asp  Thr Ala Ile
    1970                1975                1980

Ile Ser  Lys Gly Trp Gln Thr  Val Asn Gly Ser Arg  Tyr Tyr Phe
    1985                1990                1995

Asp Thr  Asp Thr Ala Ile Ala  Phe Asn Gly Tyr Lys  Thr Ile Asp
    2000                2005                2010

Gly Lys  His Phe Tyr Phe Asp  Ser Asp Cys Val Val  Lys Ile Gly
    2015                2020                2025

Val Phe  Ser Gly Ser Asn Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2030                2035                2040

Thr Tyr  Asn Asn Asn Ile Glu  Gly Gln Ala Ile Val  Tyr Gln Ser
    2045                2050                2055

Lys Phe  Leu Thr Leu Asn Gly  Lys Lys Tyr Tyr Phe  Asp Asn Asn
    2060                2065                2070

Ser Lys  Ala Val Thr Gly Trp  Gln Thr Ile Asp Ser  Lys Lys Tyr
    2075                2080                2085

Tyr Phe  Asn Thr Asn Thr Ala  Glu Ala Ala Thr Gly  Trp Gln Thr
    2090                2095                2100
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```
Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr Asn Thr  Ala Glu Ala
    2105                2110                2115

Ala Thr  Gly Trp Gln Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn
    2120                2125                2130

Thr Asn  Thr Ser Ile Ala Ser  Thr Gly Tyr Thr Ile  Ile Asn Gly
    2135                2140                2145

Lys Tyr  Phe Tyr Phe Asn Thr  Asp Gly Ile Met Gln  Ile Gly Val
    2150                2155                2160

Phe Lys  Val Pro Asn Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr
    2165                2170                2175

His Asn  Asn Asn Ile Glu Gly  Gln Ala Ile Leu Tyr  Gln Asn Lys
    2180                2185                2190

Phe Leu  Thr Leu Asn Gly Lys  Lys Tyr Tyr Phe Gly  Ser Asp Ser
    2195                2200                2205

Lys Ala  Ile Thr Gly Trp Gln  Thr Ile Asp Gly Lys  Lys Tyr Tyr
    2210                2215                2220

Phe Asn  Pro Asn Asn Ala Ile  Ala Ala Thr His Leu  Cys Thr Ile
    2225                2230                2235

Asn Asn  Asp Lys Tyr Tyr Phe  Ser Tyr Asp Gly Ile  Leu Gln Asn
    2240                2245                2250

Gly Tyr  Ile Thr Ile Glu Arg  Asn Asn Phe Tyr Phe  Asp Ala Asn
    2255                2260                2265

Asn Glu  Ser Lys Met Val Thr  Gly Val Phe Lys Gly  Pro Asn Gly
    2270                2275                2280

Phe Glu  Tyr Phe Ala Pro Ala  Asn Thr His Asn Asn  Asn Ile Glu
    2285                2290                2295
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```
Gly Gln  Ala Ile Val Tyr Gln  Asn Lys Phe Leu Thr  Leu Asn Gly
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Lys Lys  Tyr Tyr Phe Asp Asn  Asp Ser Lys Ala Val  Thr Gly Trp
    2315                2320                2325

Gln Thr  Ile Asp Ser Lys Lys  Tyr Tyr Phe Asn Leu  Asn Thr Ala
    2330                2335                2340

Val Ala  Val Thr Gly Trp Gln  Thr Ile Asp Gly Glu  Lys Tyr Tyr
    2345                2350                2355

Phe Asn  Leu Asn Thr Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile
    2360                2365                2370

Asp Gly  Lys Arg Tyr Tyr Phe  Asn Thr Asn Thr Tyr  Ile Ala Ser
    2375                2380                2385

Thr Gly  Tyr Thr Ile Ile Asn  Gly Lys His Phe Tyr  Phe Asn Thr
    2390                2395                2400

Asp Gly  Ile Met Gln Ile Gly  Val Phe Lys Gly Pro  Asp Gly Phe
    2405                2410                2415

Glu Tyr  Phe Ala Pro Ala Asn  Thr His Asn Asn Asn  Ile Glu Gly
    2420                2425                2430

Gln Ala  Ile Leu Tyr Gln Asn  Lys Phe Leu Thr Leu  Asn Gly Lys
    2435                2440                2445

Lys Tyr  Tyr Phe Gly Ser Asp  Ser Lys Ala Val Thr  Gly Leu Arg
    2450                2455                2460

Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn Thr Asn  Thr Ala Val
    2465                2470                2475

Ala Val  Thr Gly Trp Gln Thr  Ile Asn Gly Lys Lys  Tyr Tyr Phe
    2480                2485                2490
```

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```
Asn Thr  Asn Thr Tyr Ile Ala  Ser Thr Gly Tyr Thr  Ile Ile Ser
    2495                2500                2505

Gly Lys  His Phe Tyr Phe Asn  Thr Asp Gly Ile Met  Gln Ile Gly
    2510                2515                2520

Val Phe  Lys Gly Pro Asp Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2525                2530                2535

Thr Asp  Ala Asn Asn Ile Glu  Gly Gln Ala Ile Arg  Tyr Gln Asn
    2540                2545                2550

Arg Phe  Leu Tyr Leu His Asp  Asn Ile Tyr Tyr Phe  Gly Asn Asp
    2555                2560                2565

Ser Lys  Ala Ala Thr Gly Trp  Ala Thr Ile Asp Gly  Asn Arg Tyr
    2570                2575                2580

Tyr Phe  Glu Pro Asn Thr Ala  Met Gly Ala Asn Gly  Tyr Lys Thr
    2585                2590                2595

Ile Asp  Asn Lys Asn Phe Tyr  Phe Arg Asn Gly Leu  Pro Gln Ile
    2600                2605                2610

Gly Val  Phe Lys Gly Pro Asn  Gly Phe Glu Tyr Phe  Ala Pro Ala
    2615                2620                2625

Asn Thr  Asp Ala Asn Asn Ile  Asp Gly Gln Ala Ile  Arg Tyr Gln
    2630                2635                2640

Asn Arg  Phe Leu His Leu Leu  Gly Lys Ile Tyr Tyr  Phe Gly Asn
    2645                2650                2655

Asn Ser  Lys Ala Val Thr Gly  Trp Gln Thr Ile Asn  Ser Lys Val
    2660                2665                2670

Tyr Tyr  Phe Met Pro Asp Thr  Ala Met Ala Ala Ala  Gly Gly Leu
    2675                2680                2685
```

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Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
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Lys Ala Pro Gly Ile Tyr Gly
2705 2710

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aatgaaaata aatatttaca attaaaaaaa ctaaatgaat caattgatgt ttttatgaat 180

aaatataaaa attcaagcag aaatagagca ctctctaatc taaaaaaaga tatattaaaa 240

gaagtaattc ttattaaaaa ttccaataca agtcctgtag aaaaaaattt acattttgta 300

tggataggtg gagaagtcag tgatattgct cttgaataca taaaacaatg ggctgatatt 360

aatgcagaat ataatattaa actgtggtat gatagtgaag cattcttagt caatacacta 420

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<400> 19

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Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
20 25 30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
35 40 45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr
50 55 60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65 70 75 80

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Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
            100                 105                 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
        115                 120                 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
    130                 135                 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285
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Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
    290                 295                 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
                325                 330                 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
            340                 345                 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
        355                 360                 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
    370                 375                 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385                 390                 395                 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
                405                 410                 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
            420                 425                 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
        435                 440                 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
    450                 455                 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465                 470                 475                 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
                485                 490                 495
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```
Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
            500                 505                 510

Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
        515                 520                 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
    530                 535                 540

Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545                 550                 555                 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
                565                 570                 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
            580                 585                 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
        595                 600                 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
    610                 615                 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625                 630                 635                 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
                645                 650                 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
            660                 665                 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
        675                 680                 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
    690                 695                 700
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```
Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705                 710                 715                 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser
                725                 730                 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
            740                 745                 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
        755                 760                 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
    770                 775                 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785                 790                 795                 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
                805                 810                 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
            820                 825                 830

Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
        835                 840                 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
    850                 855                 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865                 870                 875                 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
                885                 890                 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
            900                 905                 910
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```
Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
        915                 920                 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
    930                 935                 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945                 950                 955                 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
                965                 970                 975

Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
            980                 985                 990

Ala Gln Leu Phe Ser Thr Gly Leu  Asn Thr Ile Tyr Asp  Ser Ile Gln
        995                 1000                1005

Leu Val  Asn Leu Ile Ser Asn  Ala Val Asn Asp Thr  Ile Asn Val
    1010                1015                1020

Leu Pro  Thr Ile Thr Glu Gly  Ile Pro Ile Val Ser  Thr Ile Leu
    1025                1030                1035

Asp Gly  Ile Asn Leu Gly Ala  Ala Ile Lys Glu Leu  Leu Asp Glu
    1040                1045                1050

His Asp  Pro Leu Leu Lys Lys  Glu Leu Glu Ala Lys  Val Gly Val
    1055                1060                1065

Leu Ala  Ile Asn Met Ser Leu  Ser Ile Ala Ala Thr  Val Ala Ser
    1070                1075                1080

Ile Val  Gly Ile Gly Ala Glu  Val Thr Ile Phe Leu  Leu Pro Ile
    1085                1090                1095

Ala Gly  Ile Ser Ala Gly Ile  Pro Ser Leu Val Asn  Asn Glu Leu
    1100                1105                1110
```

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```
Ile Leu  His Asp Lys Ala Thr  Ser Val Val Asn Tyr  Phe Asn His
    1115                1120                1125

Leu Ser  Glu Ser Lys Lys Tyr  Gly Pro Leu Lys Thr  Glu Asp Asp
    1130                1135                1140

Lys Ile  Leu Val Pro Ile Asp  Asp Leu Val Ile Ser  Glu Ile Asp
    1145                1150                1155

Phe Asn  Asn Asn Ser Ile Lys  Leu Gly Thr Cys Asn  Ile Leu Ala
    1160                1165                1170

Met Glu  Gly Gly Ser Gly His  Thr Val Thr Gly Asn  Ile Asp His
    1175                1180                1185

Phe Phe  Ser Ser Pro Ser Ile  Ser Ser His Ile Pro  Ser Leu Ser
    1190                1195                1200

Ile Tyr  Ser Ala Ile Gly Ile  Glu Thr Glu Asn Leu  Asp Phe Ser
    1205                1210                1215

Lys Lys  Ile Met Met Leu Pro  Asn Ala Pro Ser Arg  Val Phe Trp
    1220                1225                1230

Trp Glu  Thr Gly Ala Val Pro  Gly Leu Arg Ser Leu  Glu Asn Asp
    1235                1240                1245

Gly Thr  Arg Leu Leu Asp Ser  Ile Arg Asp Leu Tyr  Pro Gly Lys
    1250                1255                1260

Phe Tyr  Trp Arg Phe Tyr Ala  Phe Phe Asp Tyr Ala  Ile Thr Thr
    1265                1270                1275

Leu Lys  Pro Val Tyr Glu Asp  Thr Asn Ile Lys Ile  Lys Leu Asp
    1280                1285                1290

Lys Asp  Thr Arg Asn Phe Ile  Met Pro Thr Ile Thr  Thr Asn Glu
    1295                1300                1305
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Ile Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr
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Tyr Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn
1325 1330 1335

Leu Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val
1340 1345 1350

Arg Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu
1355 1360 1365

Ile Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu
1370 1375 1380

Ile Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn
1385 1390 1395

Lys Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile
1400 1405 1410

Ser Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu
1415 1420 1425

Leu Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn
1430 1435 1440

Thr Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile
1445 1450 1455

Ala Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala
1460 1465 1470

Ile Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp
1475 1480 1485

Ser Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe
1490 1495 1500

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```
Asn Ser  Lys Asp Phe Ile Ala  Glu Asp Ile Asn Val  Phe Met Lys
    1505                1510                1515

Asp Asp  Ile Asn Thr Ile Thr  Gly Lys Tyr Tyr Val  Asp Asn Asn
    1520                1525                1530

Thr Asp  Lys Ser Ile Asp Phe  Ser Ile Ser Leu Val  Ser Lys Asn
    1535                1540                1545

Gln Val  Lys Val Asn Gly Leu  Tyr Leu Asn Glu Ser  Val Tyr Ser
    1550                1555                1560

Ser Tyr  Leu Asp Phe Val Lys  Asn Ser Asp Gly His  His Asn Thr
    1565                1570                1575

Ser Asn  Phe Met Asn Leu Phe  Leu Asp Asn Ile Ser  Phe Trp Lys
    1580                1585                1590

Leu Phe  Gly Phe Glu Asn Ile  Asn Phe Val Ile Asp  Lys Tyr Phe
    1595                1600                1605

Thr Leu  Val Gly Lys Thr Asn  Leu Gly Tyr Val Glu  Phe Ile Cys
    1610                1615                1620

Asp Asn  Asn Lys Asn Ile Asp  Ile Tyr Phe Gly Glu  Trp Lys Thr
    1625                1630                1635

Ser Ser  Ser Lys Ser Thr Ile  Phe Ser Gly Asn Gly  Arg Asn Val
    1640                1645                1650

Val Val  Glu Pro Ile Tyr Asn  Pro Asp Thr Gly Glu  Asp Ile Ser
    1655                1660                1665

Thr Ser  Leu Asp Phe Ser Tyr  Glu Pro Leu Tyr Gly  Ile Asp Arg
    1670                1675                1680

Tyr Ile  Asn Lys Val Leu Ile  Ala Pro Asp Leu Tyr  Thr Ser Leu
    1685                1690                1695
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```
Ile Asn  Ile Asn Thr Asn Tyr  Tyr Ser Asn Glu Tyr  Tyr Pro Glu
    1700                1705                1710

Ile Ile  Val Leu Asn Pro Asn  Thr Phe His Lys Lys  Val Asn Ile
    1715                1720                1725

Asn Leu  Asp Ser Ser Ser Phe  Glu Tyr Lys Trp Ser  Thr Glu Gly
    1730                1735                1740

Ser Asp  Phe Ile Leu Val Arg  Tyr Leu Glu Glu Ser  Asn Lys Lys
    1745                1750                1755

Ile Leu  Gln Lys Ile Arg Ile  Lys Gly Ile Leu Ser  Asn Thr Gln
    1760                1765                1770

Ser Phe  Asn Lys Met Ser Ile  Asp Phe Lys Asp Ile  Lys Lys Leu
    1775                1780                1785

Ser Leu  Gly Tyr Ile Met Ser  Asn Phe Lys Ser Phe  Asn Ser Glu
    1790                1795                1800

Asn Glu  Leu Asp Arg Asp His  Leu Gly Phe Lys Ile  Ile Asp Asn
    1805                1810                1815

Lys Thr  Tyr Tyr Tyr Asp Glu  Asp Ser Lys Leu Val  Lys Gly Leu
    1820                1825                1830

Ile Asn  Ile Asn Asn Ser Leu  Phe Tyr Phe Asp Pro  Ile Glu Phe
    1835                1840                1845

Asn Leu  Val Thr Gly Trp Gln  Thr Ile Asn Gly Lys  Lys Tyr Tyr
    1850                1855                1860

Phe Asp  Ile Asn Thr Gly Ala  Ala Leu Thr Ser Tyr  Lys Ile Ile
    1865                1870                1875

Asn Gly  Lys His Phe Tyr Phe  Asn Asn Asp Gly Val  Met Gln Leu
    1880                1885                1890
```

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Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala
1895 1900 1905

Asn Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln
1910 1915 1920

Ser Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn
1925 1930 1935

Asn Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys
1940 1945 1950

Tyr Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln
1955 1960 1965

Val Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile
1970 1975 1980

Ile Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe
1985 1990 1995

Asp Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp
2000 2005 2010

Gly Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly
2015 2020 2025

Val Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2030 2035 2040

Thr Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
2045 2050 2055

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
2060 2065 2070

Ser Lys Ala Val Thr Gly Leu Gln Thr Ile Asp Ser Lys Lys Tyr
2075 2080 2085

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```
Tyr Phe  Asn Thr Asn Thr Ala  Glu Ala Ala Thr Gly  Trp Gln Thr
    2090                2095                2100

Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr Asn Thr  Ala Glu Ala
    2105                2110                2115

Ala Thr  Gly Trp Gln Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn
    2120                2125                2130

Thr Asn  Thr Ala Ile Ala Ser  Thr Gly Tyr Thr Ile  Ile Asn Gly
    2135                2140                2145

Lys His  Phe Tyr Phe Asn Thr  Asp Gly Ile Met Gln  Ile Gly Val
    2150                2155                2160

Phe Lys  Gly Pro Asn Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr
    2165                2170                2175

Asp Ala  Asn Asn Ile Glu Gly  Gln Ala Ile Leu Tyr  Gln Asn Glu
    2180                2185                2190

Phe Leu  Thr Leu Asn Gly Lys  Lys Tyr Tyr Phe Gly  Ser Asp Ser
    2195                2200                2205

Lys Ala  Val Thr Gly Trp Arg  Ile Ile Asn Asn Lys  Lys Tyr Tyr
    2210                2215                2220

Phe Asn  Pro Asn Asn Ala Ile  Ala Ala Ile His Leu  Cys Thr Ile
    2225                2230                2235

Asn Asn  Asp Lys Tyr Tyr Phe  Ser Tyr Asp Gly Ile  Leu Gln Asn
    2240                2245                2250

Gly Tyr  Ile Thr Ile Glu Arg  Asn Asn Phe Tyr Phe  Asp Ala Asn
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Asn Glu  Ser Lys Met Val Thr  Gly Val Phe Lys Gly  Pro Asn Gly
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Gly Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly
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Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp
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Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala
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Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr
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Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val
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Ala Val  Thr Gly Trp Gln Thr  Ile Asn Gly Lys Lys  Tyr Tyr Phe
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Asn Thr  Asn Thr Ser Ile Ala  Ser Thr Gly Tyr Thr  Ile Ile Ser
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Gly Lys  His Phe Tyr Phe Asn  Thr Asp Gly Ile Met  Gln Ile Gly
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Val Phe  Lys Gly Pro Asp Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
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Thr Asp  Ala Asn Asn Ile Glu  Gly Gln Ala Ile Arg  Tyr Gln Asn
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Arg Phe  Leu Tyr Leu His Asp  Asn Ile Tyr Tyr Phe  Gly Asn Asn
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Ser Lys  Ala Ala Thr Gly Trp  Val Thr Ile Asp Gly  Asn Arg Tyr
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Tyr Phe  Glu Pro Asn Thr Ala  Met Gly Ala Asn Gly  Tyr Lys Thr
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Ile Asp  Asn Lys Asn Phe Tyr  Phe Arg Asn Gly Leu  Pro Gln Ile
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Gly Val  Phe Lys Gly Ser Asn  Gly Phe Glu Tyr Phe  Ala Pro Ala
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Asn Thr  Asp Ala Asn Asn Ile  Glu Gly Gln Ala Ile  Arg Tyr Gln
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Asn Arg  Phe Leu His Leu Leu  Gly Lys Ile Tyr Tyr  Phe Gly Asn
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Asn Ser  Lys Ala Val Thr Gly  Trp Gln Thr Ile Asn  Gly Lys Val
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Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
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Lys Ala Pro Gly Ile Tyr Gly
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Phe Arg Val Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
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Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
35 40 45

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Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
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Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65                  70                  75                  80

Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys
                85                  90                  95

Asn Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
            100                 105                 110

Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
        115                 120                 125

Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
    130                 135                 140

Ile Val Glu Ser Ala Thr Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145                 150                 155                 160

Leu Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Tyr Arg Lys Arg Met
                165                 170                 175

Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Thr
            180                 185                 190

Gln Arg Glu Glu Asn Pro Asp Leu Ile Ile Asp Asp Ile Val Lys Ile
        195                 200                 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Asp Ile Asp Glu Leu Asn Ser Tyr
    210                 215                 220

Ile Glu Glu Ser Leu Asn Lys Val Thr Glu Asn Ser Gly Asn Asp Val
225                 230                 235                 240

Arg Asn Phe Glu Glu Phe Lys Gly Gly Glu Ser Phe Lys Leu Tyr Glu
                245                 250                 255
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Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu
            260                 265                 270

Arg Ile Ser Ala Leu Lys Glu Val Gly Gly Val Tyr Leu Asp Val Asp
        275                 280                 285

Met Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro
    290                 295                 300

Ser Ser Val Thr Val Asp Phe Trp Glu Met Val Lys Leu Glu Ala Ile
305                 310                 315                 320

Met Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp
                325                 330                 335

Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
            340                 345                 350

Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala
        355                 360                 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn
    370                 375                 380

Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val
385                 390                 395                 400

Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro
                405                 410                 415

Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Ala Phe Ile
            420                 425                 430

Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met
        435                 440                 445

Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr
    450                 455                 460
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Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala
                485                 490                 495

Asp Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr
            500                 505                 510

Glu Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys
        515                 520                 525

Ala Gln Phe Glu Glu Tyr Lys Lys Asn Tyr Phe Glu Gly Ser Leu Gly
    530                 535                 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Thr Val Val Asp Lys Glu
545                 550                 555                 560

Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly
                565                 570                 575

Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
            580                 585                 590

Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe
        595                 600                 605

Gln Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly
    610                 615                 620

Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile
625                 630                 635                 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp
                645                 650                 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser
            660                 665                 670
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Thr Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro
        675                 680                 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser
    690                 695                 700

Val Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Arg Val Lys
705                 710                 715                 720

Asp Lys Val Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
                725                 730                 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg
            740                 745                 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
        755                 760                 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
    770                 775                 780

Asn Lys Ile Ile Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785                 790                 795                 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu
                805                 810                 815

Glu Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
            820                 825                 830

Asp Thr Gln Val Val Glu Gly Arg Ile Glu Glu Ala Lys Ser Leu Thr
        835                 840                 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser
    850                 855                 860

Ile Ser Asp Ala Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Glu Glu
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Ser His Phe Ile Ser Phe Glu Asp Ile Leu Glu Thr Asp Glu Gly Phe
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Thr Glu Lys Ala Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu
        915                 920                 925

Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
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Val Lys Lys Val Asn Leu Asp Ala Thr His Glu Val Asn Thr Leu Asn
945                 950                 955                 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu
               965                 970                 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
            980                 985                 990

Leu Phe Ser Thr Gly Leu Asn Thr  Ile Thr Asp Ala Ala  Lys Val Val
        995                 1000                1005

Glu Leu  Val Ser Thr Ala Leu  Asp Glu Thr Ile Asp  Leu Leu Pro
    1010                1015                1020

Thr Leu  Ser Glu Gly Leu Pro  Val Ile Ala Thr Ile  Ile Asp Gly
    1025                1030                1035

Val Ser  Leu Gly Ala Ala Ile  Lys Glu Leu Ser Glu  Thr Ser Asp
    1040                1045                1050

Pro Leu  Leu Arg Gln Glu Ile  Glu Ala Lys Ile Gly  Ile Met Ala
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Val Asn  Leu Thr Ala Ala Thr  Thr Ala Ile Ile Thr  Ser Ser Leu
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Gly Ile  Ala Ser Gly Phe Ser  Ile Leu Leu Val Pro  Leu Ala Gly
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Ile Ser  Ala Gly Ile Pro Ser  Leu Val Asn Asn Glu  Leu Ile Leu
    1100                1105                1110

Arg Asp  Lys Ala Thr Lys Val  Val Asp Tyr Phe Ser  His Ile Ser
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Leu Ala  Glu Ser Glu Gly Ala  Phe Thr Ser Leu Asp  Asp Lys Ile
    1130                1135                1140

Met Met  Pro Gln Asp Asp Leu  Val Ile Ser Glu Ile  Asp Phe Asn
    1145                1150                1155

Asn Asn  Ser Ile Thr Leu Gly  Lys Cys Glu Ile Trp  Arg Met Glu
    1160                1165                1170

Gly Gly  Ser Gly His Thr Val  Thr Asp Asp Ile Asp  His Phe Phe
    1175                1180                1185

Ser Ala  Pro Ser Ile Thr Tyr  Arg Glu Pro His Leu  Ser Ile Tyr
    1190                1195                1200

Asp Val  Leu Glu Val Gln Lys  Glu Glu Leu Asp Leu  Ser Lys Asp
    1205                1210                1215

Leu Met  Val Leu Pro Asn Ala  Pro Asn Arg Val Phe  Ala Trp Glu
    1220                1225                1230

Thr Gly  Trp Thr Pro Gly Leu  Arg Ser Leu Glu Asn  Asp Gly Thr
    1235                1240                1245

Lys Leu  Leu Asp Arg Ile Arg  Asp Asn Tyr Glu Gly  Glu Phe Tyr
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Trp Arg  Tyr Phe Ala Phe Ile  Ala Asp Ala Leu Ile  Thr Thr Leu
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Lys Pro  Arg Tyr Glu Asp Thr  Asn Ile Arg Ile Asn  Leu Asp Ser
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Asn Thr  Arg Ser Phe Ile Val  Pro Val Ile Thr Thr  Glu Tyr Ile
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Arg Glu  Lys Leu Ser Tyr Ser  Phe Tyr Gly Ser Gly  Gly Thr Tyr
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Ala Leu  Ser Leu Ser Gln Tyr  Asn Met Asn Ile Asn  Ile Glu Leu
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Asn Glu  Asn Asp Thr Trp Val  Ile Asp Val Asp Asn  Val Val Arg
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Asp Val  Thr Ile Glu Ser Asp  Lys Ile Lys Lys Gly  Asp Leu Ile
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Glu Asn  Ile Leu Ser Lys Leu  Ser Ile Glu Asp Asn  Lys Ile Ile
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Leu Asp  Asn His Glu Ile Asn  Phe Ser Gly Thr Leu  Asn Gly Gly
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Asn Gly  Phe Val Ser Leu Thr  Phe Ser Ile Leu Glu  Gly Ile Asn
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Ala Val  Ile Glu Val Asp Leu  Leu Ser Lys Ser Tyr  Lys Val Leu
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Ile Ser  Gly Glu Leu Lys Thr  Leu Met Ala Asn Ser  Asn Ser Val
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Gln Gln  Lys Ile Asp Tyr Ile  Gly Leu Asn Ser Glu  Leu Gln Lys
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Asn Ile  Pro Tyr Ser Phe Met  Asp Asp Lys Gly Lys  Glu Asn Gly
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Phe Ile  Asn Cys Ser Thr Lys  Glu Gly Leu Phe Val  Ser Glu Leu
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Ser Asp  Val Val Leu Ile Ser  Lys Val Tyr Met Asp  Asn Ser Lys
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Pro Leu  Phe Gly Tyr Cys Ser  Asn Asp Leu Lys Asp  Val Lys Val
    1505                1510                1515

Ile Thr  Lys Asp Asp Val Ile  Ile Leu Thr Gly Tyr  Tyr Leu Lys
    1520                1525                1530

Asp Asp  Ile Lys Ile Ser Leu  Ser Phe Thr Ile Gln  Asp Glu Asn
    1535                1540                1545

Thr Ile  Lys Leu Asn Gly Val  Tyr Leu Asp Glu Asn  Gly Val Ala
    1550                1555                1560

Glu Ile  Leu Lys Phe Met Asn  Lys Lys Gly Ser Thr  Asn Thr Ser
    1565                1570                1575

Asp Ser  Leu Met Ser Phe Leu  Glu Ser Met Asn Ile  Lys Ser Ile
    1580                1585                1590

Phe Ile  Asn Ser Leu Gln Ser  Asn Thr Lys Leu Ile  Leu Asp Thr
    1595                1600                1605

Asn Phe  Ile Ile Ser Gly Thr  Thr Ser Ile Gly Gln  Phe Glu Phe
    1610                1615                1620

Ile Cys  Asp Lys Asp Asn Asn  Ile Gln Pro Tyr Phe  Ile Lys Phe
    1625                1630                1635

Asn Thr  Leu Glu Thr Lys Tyr  Thr Leu Tyr Val Gly  Asn Arg Gln
    1640                1645                1650

Asn Met  Ile Val Glu Pro Asn  Tyr Asp Leu Asp Asp  Ser Gly Asp
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Ile Asp Ser Cys Val Asn Lys Val Ile Ile Ser Pro Asn Ile Tyr
1685 1690 1695

Thr Asp Glu Ile Asn Ile Thr Pro Ile Tyr Glu Ala Asn Asn Thr
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Tyr Pro Glu Val Ile Val Leu Asp Thr Asn Tyr Ile Ser Glu Lys
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Ile Asn Ile Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser
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Asn Asp Gly Ser Asp Phe Ile Leu Met Ser Thr Asp Glu Glu Asn
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Lys Val Ser Gln Val Lys Ile Arg Phe Thr Asn Val Phe Lys Gly
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Asn Thr Ile Ser Asp Lys Ile Ser Phe Asn Phe Ser Asp Lys Gln
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Asp Val Ser Ile Asn Lys Val Ile Ser Thr Phe Thr Pro Ser Tyr
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Ile Lys Asn Leu Ile Thr Gly Phe Thr Thr Ile Gly Asp Asp Lys
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Tyr Tyr  Phe Asn Pro Asp Asn  Gly Gly Ala Ala Ser  Val Gly Glu
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Thr Ile  Ile Asp Gly Lys Asn  Tyr Tyr Phe Ser Gln  Asn Gly Val
    1880                1885                1890

Leu Gln  Thr Gly Val Phe Ser  Thr Glu Asp Gly Phe  Lys Tyr Phe
    1895                1900                1905

Ala Pro  Ala Asp Thr Leu Asp  Glu Asn Leu Glu Gly  Glu Ala Ile
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Asp Phe  Thr Gly Lys Leu Thr  Ile Asp Glu Asn Val  Tyr Tyr Phe
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Gly Asp  Asn Tyr Arg Ala Ala  Ile Glu Trp Gln Thr  Leu Asp Asp
    1940                1945                1950

Glu Val  Tyr Tyr Phe Ser Thr  Asp Thr Gly Arg Ala  Phe Lys Gly
    1955                1960                1965

Leu Asn  Gln Ile Gly Asp Asp  Lys Phe Tyr Phe Asn  Ser Asp Gly
    1970                1975                1980

Ile Met  Gln Lys Gly Phe Val  Asn Ile Asn Asp Lys  Thr Phe Tyr
    1985                1990                1995

Phe Asp  Asp Ser Gly Val Met  Lys Ser Gly Tyr Thr  Glu Ile Asp
    2000                2005                2010

Gly Lys  Tyr Phe Tyr Phe Ala  Glu Asn Gly Glu Met  Gln Ile Gly
    2015                2020                2025

Val Phe  Asn Thr Ala Asp Gly  Phe Lys Tyr Phe Ala  His His Asp
    2030                2035                2040

Glu Asp  Leu Gly Asn Glu Glu  Gly Glu Ala Leu Ser  Tyr Ser Gly
    2045                2050                2055
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Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe
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Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr
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Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Ile Ser Ile
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Ile Asn Asp Gly Lys Tyr Tyr Phe Asn Asp Ser Gly Ile Met Gln
2105 2110 2115

Ile Gly Phe Val Thr Ile Asn Asn Glu Val Phe Tyr Phe Ser Asp
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Phe Asp Pro Glu Thr Lys Lys Ala Tyr Lys Gly Ile Asn Val Ile
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Gly Leu Ile Thr Phe Glu Asp Asn His Tyr Tyr Phe Asn Glu Asp
2255 2260 2265

Gly Ile Met Gln Tyr Gly Tyr Leu Asn Ile Glu Asp Lys Thr Phe
2270 2275 2280

Tyr Phe Ser Glu Asp Gly Ile Met Gln Ile Gly Val Phe Asn Thr
2285 2290 2295

Pro Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu
2300 2305 2310

Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu
2315 2320 2325

Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr
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Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
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Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
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Asn Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
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Arg Ile Ser Ala Leu Lys Glu Val Gly Gly Val Tyr Leu Asp Val Asp
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Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Thr Val Val Asp Lys Glu
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Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly
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Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
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Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe
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Gln Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly
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Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile
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Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp
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Glu Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser
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Thr Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro
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Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser
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Val Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Arg Val Lys
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Asp Lys Val Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
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Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg
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Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
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Asn Lys Ile Ile Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
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Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu
                805                 810                 815

Glu Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
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Asp Thr Gln Val Val Glu Gly Arg Ile Glu Glu Ala Lys Ser Leu Thr
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Ser Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser
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Ile Ser Asp Ala Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Glu Glu
865                 870                 875                 880

Ser His Phe Ile Ser Phe Glu Asp Ile Leu Glu Thr Asp Glu Gly Phe
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Ser Ile Arg Phe Ile Asp Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
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Thr Glu Lys Ala Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu
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Val Lys Lys Val Asn Leu Asp Ala Thr His Glu Val Asn Thr Leu Asn
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Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
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Leu Phe Ser Thr Gly Leu Asn Thr  Ile Thr Asp Ala Ala  Lys Val Val
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Glu Leu  Val Ser Thr Ala Leu  Asp Glu Thr Ile Asp  Leu Leu Pro
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Thr Leu  Ser Glu Gly Leu Pro  Val Ile Ala Thr Ile  Ile Asp Gly
    1025                1030                1035

Val Ser  Leu Gly Ala Ala Ile  Lys Glu Leu Ser Glu  Thr Ser Asp
    1040                1045                1050

Pro Leu  Leu Arg Gln Glu Ile  Glu Ala Lys Ile Gly  Ile Met Ala
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Val Asn  Leu Thr Ala Ala Thr  Thr Ala Ile Ile Thr  Ser Ser Leu
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Gly Ile  Ala Ser Gly Phe Ser  Ile Leu Leu Val Pro  Leu Ala Gly
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Ile Ser  Ala Gly Ile Pro Ser  Leu Val Asn Asn Glu  Leu Ile Leu
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Arg Asp  Lys Ala Thr Lys Val  Val Asp Tyr Phe Ser  His Ile Ser
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Leu Ala  Glu Ser Glu Gly Ala  Phe Thr Ser Leu Asp  Asp Lys Ile
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    1160                1165                1170

Gly Gly  Ser Gly His Thr Val  Thr Asp Asp Ile Asp  His Phe Phe
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Ser Ala  Pro Ser Ile Thr Tyr  Arg Glu Pro His Leu  Ser Ile Tyr
    1190                1195                1200

Asp Val  Leu Glu Val Gln Lys  Glu Glu Leu Asp Leu  Ser Lys Asp
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Leu Met  Val Leu Pro Asn Ala  Pro Asn Arg Val Phe  Ala Trp Glu
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Thr Gly  Trp Thr Pro Gly Leu  Arg Ser Leu Glu Asn  Asp Gly Thr
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Lys Leu  Leu Asp Arg Ile Arg  Asp Asn Tyr Glu Gly  Glu Phe Tyr
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Trp Arg  Tyr Phe Ala Phe Ile  Ala Asp Ala Leu Ile  Thr Thr Leu
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Lys Pro  Arg Tyr Glu Asp Thr  Asn Ile Arg Ile Asn  Leu Asp Ser
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Asn Thr  Arg Ser Phe Ile Val  Pro Val Ile Thr Thr  Glu Tyr Ile
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Arg Glu  Lys Leu Ser Tyr Ser  Phe Tyr Gly Ser Gly  Gly Thr Tyr
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Ala Leu  Ser Leu Ser Gln Tyr  Asn Met Asn Ile Asn  Ile Glu Leu
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Asn Glu  Asn Asp Thr Trp Val  Ile Asp Val Asp Asn  Val Val Arg
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Asp Val  Thr Ile Glu Ser Asp  Lys Ile Lys Lys Gly  Asp Leu Ile
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Glu Asn  Ile Leu Ser Lys Leu  Ser Ile Glu Asp Asn  Lys Ile Ile
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Leu Asp  Asn His Glu Ile Asn  Phe Ser Gly Thr Leu  Asn Gly Gly
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Asn Gly  Phe Val Ser Leu Thr  Phe Ser Ile Leu Glu  Gly Ile Asn
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Ala Val  Ile Glu Val Asp Leu  Leu Ser Lys Ser Tyr  Lys Val Leu
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Ile Ser  Gly Glu Leu Lys Thr  Leu Met Ala Asn Ser  Asn Ser Val
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Gln Gln  Lys Ile Asp Tyr Ile  Gly Leu Asn Ser Glu  Leu Gln Lys
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Asn Ile  Pro Tyr Ser Phe Met  Asp Asp Lys Gly Lys  Glu Asn Gly
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Phe Ile  Asn Cys Ser Thr Lys  Glu Gly Leu Phe Val  Ser Glu Leu
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Ser Asp  Val Val Leu Ile Ser  Lys Val Tyr Met Asp  Asn Ser Lys
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Pro Leu  Phe Gly Tyr Cys Ser  Asn Asp Leu Lys Asp  Val Lys Val
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Ile Thr  Lys Asp Asp Val Ile  Ile Leu Thr Gly Tyr  Tyr Leu Lys
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Glu Ile  Leu Lys Phe Met Asn  Lys Lys Gly Ser Thr  Asn Thr Ser
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Asp Ser  Leu Met Ser Phe Leu  Glu Ser Met Asn Ile  Lys Ser Ile
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Phe Ile  Asn Ser Leu Gln Ser  Asn Thr Lys Leu Ile  Leu Asp Thr
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Asn Phe  Ile Ile Ser Gly Thr  Thr Ser Ile Gly Gln  Phe Glu Phe
    1610                1615                1620

Ile Cys  Asp Lys Asp Asn Asn  Ile Gln Pro Tyr Phe  Ile Lys Phe
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Asn Thr  Leu Glu Thr Lys Tyr  Thr Leu Tyr Val Gly  Asn Arg Gln
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Asn Met  Ile Val Glu Pro Asn  Tyr Asp Leu Asp Asp  Ser Gly Asp
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Ile Ser  Ser Thr Val Ile Asn  Phe Ser Gln Lys Tyr  Leu Tyr Gly
    1670                1675                1680

Ile Asp  Ser Cys Val Asn Lys  Val Ile Ile Ser Pro  Asn Ile Tyr
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Thr Asp  Glu Ile Asn Ile Thr  Pro Ile Tyr Glu Ala  Asn Asn Thr
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Tyr Pro  Glu Val Ile Val Leu  Asp Thr Asn Tyr Ile  Ser Glu Lys
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Ile Asn  Ile Asn Ile Asn Asp  Leu Ser Ile Arg Tyr  Val Trp Ser
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Asn Asp  Gly Ser Asp Phe Ile  Leu Met Ser Thr Asp  Glu Glu Asn
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Lys Val  Ser Gln Val Lys Ile  Arg Phe Thr Asn Val  Phe Lys Gly
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Asn Thr  Ile Ser Asp Lys Ile  Ser Phe Asn Phe Ser  Asp Lys Gln
    1775                1780                1785

Asp Val  Ser Ile Asn Lys Val  Ile Ser Thr Phe Thr  Pro Ser Tyr
    1790                1795                1800

Tyr Val  Glu Gly Leu Leu Asn  Tyr Asp Leu Gly Leu  Ile Ser Leu
    1805                1810                1815

Tyr Asn  Glu Lys Phe Tyr Ile  Asn Asn Phe Gly Met  Met Val Ser
    1820                1825                1830

Gly Leu  Val Tyr Ile Asn Asp  Ser Leu Tyr Tyr Phe  Lys Pro Pro
    1835                1840                1845

Ile Lys  Asn Leu Ile Thr Gly  Phe Thr Thr Ile Gly  Asp Asp Lys
    1850                1855                1860

Tyr Tyr  Phe Asn Pro Asp Asn  Gly Gly Ala Ala Ser  Val Gly Glu
    1865                1870                1875

Thr Ile  Ile Asp Gly Lys Asn  Tyr Tyr Phe Ser Gln  Asn Gly Val
    1880                1885                1890

Leu Gln  Thr Gly Val Phe Ser  Thr Glu Asp Gly Phe  Lys Tyr Phe
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Ala Pro  Ala Asp Thr Leu Asp  Glu Asn Leu Glu Gly  Glu Ala Ile
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Asp Phe  Thr Gly Lys Leu Thr  Ile Asp Glu Asn Val  Tyr Tyr Phe
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Gly Asp  Asn Tyr Arg Ala Ala  Ile Glu Trp Gln Thr  Leu Asp Asp
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Glu Val  Tyr Tyr Phe Ser Thr  Asp Thr Gly Arg Ala  Phe Lys Gly
    1955                1960                1965

Leu Asn  Gln Ile Gly Asp Asp  Lys Phe Tyr Phe Asn  Ser Asp Gly
    1970                1975                1980

Ile Met  Gln Lys Gly Phe Val  Asn Ile Asn Asp Lys  Thr Phe Tyr
    1985                1990                1995

Phe Asp  Asp Ser Gly Val Met  Lys Ser Gly Tyr Thr  Glu Ile Asp
    2000                2005                2010

Gly Lys  Tyr Phe Tyr Phe Ala  Glu Asn Gly Glu Met  Gln Ile Gly
    2015                2020                2025

Val Phe  Asn Thr Ala Asp Gly  Phe Lys Tyr Phe Ala  His His Asp
    2030                2035                2040

Glu Asp  Leu Gly Asn Glu Glu  Gly Glu Ala Leu Ser  Tyr Ser Gly
    2045                2050                2055

Ile Leu  Asn Phe Asn Asn Lys  Ile Tyr Tyr Phe Asp  Asp Ser Phe
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Thr Ala  Val Val Gly Trp Lys  Asp Leu Glu Asp Gly  Ser Lys Tyr
    2075                2080                2085

Tyr Phe  Asp Glu Asp Thr Ala  Glu Ala Tyr Ile Gly  Ile Ser Ile
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Ile Asn  Asp Gly Lys Tyr Tyr  Phe Asn Asp Ser Gly  Ile Met Gln
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Ile Gly  Phe Val Thr Ile Asn  Asn Glu Val Phe Tyr  Phe Ser Asp
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Ser Gly  Ile Val Glu Ser Gly  Met Gln Asn Ile Asp  Asp Asn Tyr
    2135                2140                2145

Phe Tyr  Ile Asp Glu Asn Gly  Leu Val Gln Ile Gly  Val Phe Asp
    2150                2155                2160

Thr Ser  Asp Gly Tyr Lys Tyr  Phe Ala Pro Ala Asn  Thr Val Asn
    2165                2170                2175

Asp Asn  Ile Tyr Gly Gln Ala  Val Glu Tyr Ser Gly  Leu Val Arg
    2180                2185                2190

Val Gly  Glu Asp Val Tyr Tyr  Phe Gly Glu Thr Tyr  Thr Ile Glu
    2195                2200                2205

Thr Gly  Trp Ile Tyr Asp Met  Glu Asn Glu Ser Asp  Lys Tyr Tyr
    2210                2215                2220

Phe Asp  Pro Glu Thr Lys Lys  Ala Tyr Lys Gly Ile  Asn Val Ile
    2225                2230                2235

Asp Asp  Ile Lys Tyr Tyr Phe  Asp Glu Asn Gly Ile  Met Arg Thr
    2240                2245                2250

Gly Leu  Ile Thr Phe Glu Asp  Asn His Tyr Tyr Phe  Asn Glu Asp
    2255                2260                2265

Gly Ile  Met Gln Tyr Gly Tyr  Leu Asn Ile Glu Asp  Lys Thr Phe
    2270                2275                2280

Tyr Phe  Ser Glu Asp Gly Ile  Met Gln Ile Gly Val  Phe Asn Thr
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Pro Asp  Gly Phe Lys Tyr Phe  Ala His Gln Asn Thr  Leu Asp Glu
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Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
        35                  40                  45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
    50                  55                  60

Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65                  70                  75                  80

Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys
                85                  90                  95

Asn Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
            100                 105                 110

Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
        115                 120                 125

Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
    130                 135                 140

Val Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145                 150                 155                 160

Leu Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met
                165                 170                 175
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```
Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala
            180                 185                 190

Gln Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr
        195                 200                 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr
    210                 215                 220

Ile Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val
225                 230                 235                 240

Arg Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu
                245                 250                 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu
            260                 265                 270

Arg Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp
        275                 280                 285

Met Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro
    290                 295                 300

Ser Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile
305                 310                 315                 320

Met Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp
                325                 330                 335

Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
            340                 345                 350

Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala
        355                 360                 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn
    370                 375                 380
```

```
Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val
385                 390                 395                 400

Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro
                405                 410                 415

Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile
            420                 425                 430

Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met
        435                 440                 445

Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr
    450                 455                 460

Thr Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp
465                 470                 475                 480

Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala
                485                 490                 495

Asp Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr
            500                 505                 510

Glu Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys
        515                 520                 525

Ala Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly
    530                 535                 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu
545                 550                 555                 560

Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly
                565                 570                 575

Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
            580                 585                 590
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```
Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe
        595                 600                 605

Gln Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly
    610                 615                 620

Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile
625                 630                 635                 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp
                645                 650                 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser
            660                 665                 670

Thr Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro
        675                 680                 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser
    690                 695                 700

Ile Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys
705                 710                 715                 720

Asp Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
                725                 730                 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg
            740                 745                 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
        755                 760                 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
    770                 775                 780

Asn Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785                 790                 795                 800
```

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```
Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu
                805                 810                 815

Glu Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
            820                 825                 830

Asp Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr
        835                 840                 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser
    850                 855                 860

Ile Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp
865                 870                 875                 880

Ser His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe
                885                 890                 895

Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
            900                 905                 910

Thr Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu
        915                 920                 925

Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
    930                 935                 940

Val Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn
945                 950                 955                 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu
                965                 970                 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
            980                 985                 990

Leu Phe Ser Thr Gly Leu Asn Thr  Ile Thr Asp Ala Ala  Lys Val Val
        995                 1000                1005
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Glu Leu  Val Ser Thr Ala Leu  Asp Glu Thr Ile Asp  Leu Leu Pro
    1010                1015                1020

Thr Leu  Ser Glu Gly Leu Pro  Ile Ile Ala Thr Ile  Ile Asp Gly
    1025                1030                1035

Val Ser  Leu Gly Ala Ala Ile  Lys Glu Leu Ser Glu  Thr Ser Asp
    1040                1045                1050

Pro Leu  Leu Arg Gln Glu Ile  Glu Ala Lys Ile Gly  Ile Met Ala
    1055                1060                1065

Val Asn  Leu Thr Thr Ala Thr  Thr Ala Ile Ile Thr  Ser Ser Leu
    1070                1075                1080

Gly Ile  Ala Ser Gly Phe Ser  Ile Leu Leu Val Pro  Leu Ala Gly
    1085                1090                1095

Ile Ser  Ala Gly Ile Pro Ser  Leu Val Asn Asn Glu  Leu Val Leu
    1100                1105                1110

Arg Asp  Lys Ala Thr Lys Val  Val Asp Tyr Phe Lys  His Val Ser
    1115                1120                1125

Leu Val  Glu Thr Glu Gly Val  Phe Thr Leu Leu Asp  Asp Lys Ile
    1130                1135                1140

Met Met  Pro Gln Asp Asp Leu  Val Ile Ser Glu Ile  Asp Phe Asn
    1145                1150                1155

Asn Asn  Ser Ile Val Leu Gly  Lys Cys Glu Ile Trp  Arg Met Glu
    1160                1165                1170

Gly Gly  Ser Gly His Thr Val  Thr Asp Asp Ile Asp  His Phe Phe
    1175                1180                1185

Ser Ala  Pro Ser Ile Thr Tyr  Arg Glu Pro His Leu  Ser Ile Tyr
    1190                1195                1200
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```
Asp Val  Leu Glu Val Gln Lys  Glu Glu Leu Asp Leu  Ser Lys Asp
    1205                 1210                 1215

Leu Met  Val Leu Pro Asn Ala  Pro Asn Arg Val Phe  Ala Trp Glu
    1220                 1225                 1230

Thr Gly  Trp Thr Pro Gly Leu  Arg Ser Leu Glu Asn  Asp Gly Thr
    1235                 1240                 1245

Lys Leu  Leu Asp Arg Ile Arg  Asp Asn Tyr Glu Gly  Glu Phe Tyr
    1250                 1255                 1260

Trp Arg  Tyr Phe Ala Phe Ile  Ala Asp Ala Leu Ile  Thr Thr Leu
    1265                 1270                 1275

Lys Pro  Arg Tyr Glu Asp Thr  Asn Ile Arg Ile Asn  Leu Asp Ser
    1280                 1285                 1290

Asn Thr  Arg Ser Phe Ile Val  Pro Ile Ile Thr Thr  Glu Tyr Ile
    1295                 1300                 1305

Arg Glu  Lys Leu Ser Tyr Ser  Phe Tyr Gly Ser Gly  Gly Thr Tyr
    1310                 1315                 1320

Ala Leu  Ser Leu Ser Gln Tyr  Asn Met Gly Ile Asn  Ile Glu Leu
    1325                 1330                 1335

Ser Glu  Ser Asp Val Trp Ile  Ile Asp Val Asp Asn  Val Val Arg
    1340                 1345                 1350

Asp Val  Thr Ile Glu Ser Asp  Lys Ile Lys Lys Gly  Asp Leu Ile
    1355                 1360                 1365

Glu Gly  Ile Leu Ser Thr Leu  Ser Ile Glu Glu Asn  Lys Ile Ile
    1370                 1375                 1380

Leu Asn  Ser His Glu Ile Asn  Phe Ser Gly Glu Val  Asn Gly Ser
    1385                 1390                 1395
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Asn Gly  Phe Val Ser Leu Thr  Phe Ser Ile Leu Glu  Gly Ile Asn
    1400                1405                1410

Ala Ile  Ile Glu Val Asp Leu  Leu Ser Lys Ser Tyr  Lys Leu Leu
    1415                1420                1425

Ile Ser  Gly Glu Leu Lys Ile  Leu Met Leu Asn Ser  Asn His Ile
    1430                1435                1440

Gln Gln  Lys Ile Asp Tyr Ile  Gly Phe Asn Ser Glu  Leu Gln Lys
    1445                1450                1455

Asn Ile  Pro Tyr Ser Phe Val  Asp Ser Glu Gly Lys  Glu Asn Gly
    1460                1465                1470

Phe Ile  Asn Gly Ser Thr Lys  Glu Gly Leu Phe Val  Ser Glu Leu
    1475                1480                1485

Pro Asp  Val Val Leu Ile Ser  Lys Val Tyr Met Asp  Asp Ser Lys
    1490                1495                1500

Pro Ser  Phe Gly Tyr Tyr Ser  Asn Asn Leu Lys Asp  Val Lys Val
    1505                1510                1515

Ile Thr  Lys Asp Asn Val Asn  Ile Leu Thr Gly Tyr  Tyr Leu Lys
    1520                1525                1530

Asp Asp  Ile Lys Ile Ser Leu  Ser Leu Thr Leu Gln  Asp Glu Lys
    1535                1540                1545

Thr Ile  Lys Leu Asn Ser Val  His Leu Asp Glu Ser  Gly Val Ala
    1550                1555                1560

Glu Ile  Leu Lys Phe Met Asn  Arg Lys Gly Asn Thr  Asn Thr Ser
    1565                1570                1575

Asp Ser  Leu Met Ser Phe Leu  Glu Ser Met Asn Ile  Lys Ser Ile
    1580                1585                1590
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```
Phe Val  Asn Phe Leu Gln Ser  Asn Ile Lys Phe Ile  Leu Asp Ala
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Asn Phe  Ile Ile Ser Gly Thr  Thr Ser Ile Gly Gln  Phe Glu Phe
    1610                1615                1620

Ile Cys  Asp Glu Asn Asp Asn  Ile Gln Pro Tyr Phe  Ile Lys Phe
    1625                1630                1635

Asn Thr  Leu Glu Thr Asn Tyr  Thr Leu Tyr Val Gly  Asn Arg Gln
    1640                1645                1650

Asn Met  Ile Val Glu Pro Asn  Tyr Asp Leu Asp Asp  Ser Gly Asp
    1655                1660                1665

Ile Ser  Ser Thr Val Ile Asn  Phe Ser Gln Lys Tyr  Leu Tyr Gly
    1670                1675                1680

Ile Asp  Ser Cys Val Asn Lys  Val Val Ile Ser Pro  Asn Ile Tyr
    1685                1690                1695

Thr Asp  Glu Ile Asn Ile Thr  Pro Val Tyr Glu Thr  Asn Asn Thr
    1700                1705                1710

Tyr Pro  Glu Val Ile Val Leu  Asp Ala Asn Tyr Ile  Asn Glu Lys
    1715                1720                1725

Ile Asn  Val Asn Ile Asn Asp  Leu Ser Ile Arg Tyr  Val Trp Ser
    1730                1735                1740

Asn Asp  Gly Asn Asp Phe Ile  Leu Met Ser Thr Ser  Glu Glu Asn
    1745                1750                1755

Lys Val  Ser Gln Val Lys Ile  Arg Phe Val Asn Val  Phe Lys Asp
    1760                1765                1770

Lys Thr  Leu Ala Asn Lys Leu  Ser Phe Asn Phe Ser  Asp Lys Gln
    1775                1780                1785
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Asp Val  Pro Val Ser Glu Ile  Ile Leu Ser Phe Thr  Pro Ser Tyr
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Tyr Glu  Asp Gly Leu Ile Gly  Tyr Asp Leu Gly Leu  Val Ser Leu
    1805                1810                1815

Tyr Asn  Glu Lys Phe Tyr Ile  Asn Asn Phe Gly Met  Met Val Ser
    1820                1825                1830

Gly Leu  Ile Tyr Ile Asn Asp  Ser Leu Tyr Tyr Phe  Lys Pro Pro
    1835                1840                1845

Val Asn  Asn Leu Ile Thr Gly  Phe Val Thr Val Gly  Asp Asp Lys
    1850                1855                1860

Tyr Tyr  Phe Asn Pro Ile Asn  Gly Gly Ala Ala Ser  Ile Gly Glu
    1865                1870                1875

Thr Ile  Ile Asp Asp Lys Asn  Tyr Tyr Phe Asn Gln  Ser Gly Val
    1880                1885                1890

Leu Gln  Thr Gly Val Phe Ser  Thr Glu Asp Gly Phe  Lys Tyr Phe
    1895                1900                1905

Ala Pro  Ala Asn Thr Leu Asp  Glu Asn Leu Glu Gly  Glu Ala Ile
    1910                1915                1920

Asp Phe  Thr Gly Lys Leu Ile  Ile Asp Glu Asn Ile  Tyr Tyr Phe
    1925                1930                1935

Asp Asp  Asn Tyr Arg Gly Ala  Val Glu Trp Lys Glu  Leu Asp Gly
    1940                1945                1950

Glu Met  His Tyr Phe Ser Pro  Glu Thr Gly Lys Ala  Phe Lys Gly
    1955                1960                1965

Leu Asn  Gln Ile Gly Asp Tyr  Lys Tyr Tyr Phe Asn  Ser Asp Gly
    1970                1975                1980
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```
Val Met  Gln Lys Gly Phe Val  Ser Ile Asn Asp Asn  Lys His Tyr
    1985                1990                1995

Phe Asp  Asp Ser Gly Val Met  Lys Val Gly Tyr Thr  Glu Ile Asp
    2000                2005                2010

Gly Lys  His Phe Tyr Phe Ala  Glu Asn Gly Glu Met  Gln Ile Gly
    2015                2020                2025

Val Phe  Asn Thr Glu Asp Gly  Phe Lys Tyr Phe Ala  His His Asn
    2030                2035                2040

Glu Asp  Leu Gly Asn Glu Glu  Gly Glu Glu Ile Ser  Tyr Ser Gly
    2045                2050                2055

Ile Leu  Asn Phe Asn Asn Lys  Ile Tyr Tyr Phe Asp  Asp Ser Phe
    2060                2065                2070

Thr Ala  Val Val Gly Trp Lys  Asp Leu Glu Asp Gly  Ser Lys Tyr
    2075                2080                2085

Tyr Phe  Asp Glu Asp Thr Ala  Glu Ala Tyr Ile Gly  Leu Ser Leu
    2090                2095                2100

Ile Asn  Asp Gly Gln Tyr Tyr  Phe Asn Asp Asp Gly  Ile Met Gln
    2105                2110                2115

Val Gly  Phe Val Thr Ile Asn  Asp Lys Val Phe Tyr  Phe Ser Asp
    2120                2125                2130

Ser Gly  Ile Ile Glu Ser Gly  Val Gln Asn Ile Asp  Asp Asn Tyr
    2135                2140                2145

Phe Tyr  Ile Asp Asp Asn Gly  Ile Val Gln Ile Gly  Val Phe Asp
    2150                2155                2160

Thr Ser  Asp Gly Tyr Lys Tyr  Phe Ala Pro Ala Asn  Thr Val Asn
    2165                2170                2175
```

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```
Asp Asn  Ile Tyr Gly Gln Ala  Val Glu Tyr Ser Gly  Leu Val Arg
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Val Gly  Glu Asp Val Tyr Tyr  Phe Gly Glu Thr Tyr  Thr Ile Glu
    2195                 2200                 2205

Thr Gly  Trp Ile Tyr Asp Met  Glu Asn Glu Ser Asp  Lys Tyr Tyr
    2210                 2215                 2220

Phe Asn  Pro Glu Thr Lys Lys  Ala Cys Lys Gly Ile  Asn Leu Ile
    2225                 2230                 2235

Asp Asp  Ile Lys Tyr Tyr Phe  Asp Glu Lys Gly Ile  Met Arg Thr
    2240                 2245                 2250

Gly Leu  Ile Ser Phe Glu Asn  Asn Asn Tyr Tyr Phe  Asn Glu Asn
    2255                 2260                 2265

Gly Glu  Met Gln Phe Gly Tyr  Ile Asn Ile Glu Asp  Lys Met Phe
    2270                 2275                 2280

Tyr Phe  Gly Glu Asp Gly Val  Met Gln Ile Gly Val  Phe Asn Thr
    2285                 2290                 2295

Pro Asp  Gly Phe Lys Tyr Phe  Ala His Gln Asn Thr  Leu Asp Glu
    2300                 2305                 2310

Asn Phe  Glu Gly Glu Ser Ile  Asn Tyr Thr Gly Trp  Leu Asp Leu
    2315                 2320                 2325

Asp Glu  Lys Arg Tyr Tyr Phe  Thr Asp Glu Tyr Ile  Ala Ala Thr
    2330                 2335                 2340

Gly Ser  Val Ile Ile Asp Gly  Glu Glu Tyr Tyr Phe  Asp Pro Asp
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Thr Ala  Gln Leu Val Ile Ser  Glu
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gctttttta tgttcttcta ttctaaatac atctatattt gaatggacaa gcataccatt 25080

tattttagcg acatctgagt cttttaaatt ttcaatagtc aagtacccat cttgtataag 25140

tgacatatat cctttagtat ttaatagttt ttgtgcagat acaacattct tagttttgat 25200

agcaatctga ctttgacctc tattatgaag ttcttttatg ctatcttgaa aaaccagttc 25260

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gccatgattt attattccta ttgatgtggc aatttggtca atttcactta aaagatggct 25320

agagattaga acagtcatcc cgtatttttc tggtagagat tttattaatt ctctaatttc 25380

ctcaatccct gctgggtcga gtccatttgt aggttcatca agtattaata atttgggaaa 25440

cttcattatt gccatagcaa tgccaagacg ttgcttcata cctaaagaat attgactaac 25500

ttttttattt ttttgatttt ctaaccttac aatttttaat gcttcattta catttttttt 25560

aggtaaatct aagagtcttt gcattatggt catgttttca agccctgtaa gatgaccata 25620

gtatgatgga gattctatca aagaacctat atcttttaaa attgatattc tatttttttc 25680

atttaactct ttacctaaaa tattaatatt tccttgtgtg ggtttagcaa gtccaagaag 25740

cattttaaga gtggtagatt ttccagctcc attaggaccc aaaaaaccat atacagctcc 25800

ttgtggaact cttaggtcta tatcctttac tctaaatatt ttattgtatt cctttgaaag 25860

tctttgtgtt ctaattatca tttccatatg tttcatcccc ttttttaatc tgtgcttatt 25920

gattctttta acttatatca gtataataac ttggttacat ttcaattagc tgaaatttac 25980

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<210> 28
<211> 193
<212> PRT
<213> Clostridium difficile

<400> 28

Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr Ile Lys Gln
1 5 10 15

Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp Tyr Asp Ser
20 25 30

Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val Glu Ser Ser
35 40 45

Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln Asn Pro Gln
50 55 60

Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe Ile Tyr Asp

65 70 75 80

Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile Asn Lys Pro
85 90 95

Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu Val Ser Glu
100 105 110

Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr Asn Ser Leu
115 120 125

Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala Asn Ser Leu
130 135 140

Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu Leu Leu Asn
145 150 155 160

Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu Leu Ala Leu
165 170 175

Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met Leu Pro Gly Ile
180 185 190

His

<210> 29
<211> 542
<212> PRT
<213> Clostridium difficile

<400> 29

Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1 5 10 15

Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
20 25 30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
35 40 45

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```
Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr
    50                  55                  60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65                  70                  75                  80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
            100                 105                 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
        115                 120                 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
    130                 135                 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255
```

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```
Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
    290                 295                 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
                325                 330                 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
            340                 345                 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
        355                 360                 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
    370                 375                 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385                 390                 395                 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
                405                 410                 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
            420                 425                 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
        435                 440                 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
    450                 455                 460
```

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Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465 470 475 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
485 490 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
500 505 510

Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
515 520 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu
530 535 540

<210> 30
<211> 193
<212> PRT
<213> Clostridium difficile

<400> 30

Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn Tyr Ile Asn
1 5 10 15

Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val Phe Tyr Asp
20 25 30

Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val Val Glu Ser
35 40 45

Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu Asn Asp Pro
50 55 60

Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu Ile Ile Tyr
65 70 75 80

Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln Arg Glu Glu
85 90 95

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Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr Leu Ser Asn
100 105 110

Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile Glu Glu Ser
115 120 125

Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg Asn Phe Glu
130 135 140

Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln Glu Leu Val
145 150 155 160

Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg Ile Ser Ala
165 170 175

Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp Met Leu Pro Gly
180 185 190

Ile

<210> 31
<211> 543
<212> PRT
<213> Clostridium difficile

<400> 31

Met Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg
1 5 10 15

Phe Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
20 25 30

Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
35 40 45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
50 55 60

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```
Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65                  70                  75                  80

Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys
                85                  90                  95

Asn Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
            100                 105                 110

Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
        115                 120                 125

Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
    130                 135                 140

Val Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145                 150                 155                 160

Leu Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met
                165                 170                 175

Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala
            180                 185                 190

Gln Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr
        195                 200                 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr
    210                 215                 220

Ile Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val
225                 230                 235                 240

Arg Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu
                245                 250                 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu
            260                 265                 270
```

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```
Arg Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp
        275                 280                 285

Met Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro
    290                 295                 300

Ser Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile
305                 310                 315                 320

Met Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp
                325                 330                 335

Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
            340                 345                 350

Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala
        355                 360                 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn
    370                 375                 380

Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val
385                 390                 395                 400

Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro
                405                 410                 415

Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile
            420                 425                 430

Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met
        435                 440                 445

Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr
    450                 455                 460

Thr Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp
465                 470                 475                 480
```

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Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala
485 490 495

Asp Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr
500 505 510

Glu Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys
515 520 525

Ala Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 32
<211> 267
<212> PRT
<213> Clostridium difficile

<400> 32

Ser Glu Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys
1 5 10 15

Asn Tyr Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala
20 25 30

Gly Ser Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp
35 40 45

Ile Ser Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn
50 55 60

Ser Ile Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe
65 70 75 80

Leu Ser Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile
85 90 95

Pro Glu Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly
100 105 110

His Gly Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val

115 120 125

Asp Ser Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu
130 135 140

Asp Ile Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met
145 150 155 160

Phe Ser Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu
165 170 175

Leu Ser Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys
180 185 190

Asn Ser Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser
195 200 205

Glu Gly Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys
210 215 220

Glu Glu Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe
225 230 235 240

Asp Ser Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly
245 250 255

Leu Ala Ser Ile Ser Glu Asp Ile Lys Thr Leu
260 265

<210> 33
<211> 224
<212> PRT
<213> Clostridium difficile

<400> 33

Gly Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys
1 5 10 15

Glu Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg
20 25 30

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```
Gly Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr
        35                  40                  45

Glu Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu
    50                  55                  60

Phe Gln Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro
65                  70                  75                  80

Gly Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile
                85                  90                  95

Ile Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys
            100                 105                 110

Asp Glu Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu
        115                 120                 125

Ser Thr Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser
    130                 135                 140

Pro Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr
145                 150                 155                 160

Ser Ile Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val
                165                 170                 175

Lys Asp Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile
            180                 185                 190

Ile Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
        195                 200                 205

Arg Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser
    210                 215                 220
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<210> 34
<211> 2710

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<212> PRT
<213> Artificial

<220>
<223> Synthetic amino acid sequence: mutant C. difficile TcdA

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<222> (101)..(101)
<223> Xaa is any amino acid

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<223> Xaa is any amino acid

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<223> Xaa is any amino acid.

<220>
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<222> (700)..(700)
<223> Xaa is any amino acid.

<400> 34

Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1 5 10 15

Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
20 25 30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
35 40 45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr
50 55 60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65 70 75 80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Xaa Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
100 105 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
115 120 125

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```
Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
    130                 135                 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Xaa Ile Val Xaa
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Xaa Val Xaa Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
    290                 295                 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
                325                 330                 335
```

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```
Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
            340                 345                 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
        355                 360                 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
    370                 375                 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385                 390                 395                 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
                405                 410                 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
            420                 425                 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
        435                 440                 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Xaa Ala Xaa Ser Thr
    450                 455                 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465                 470                 475                 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
                485                 490                 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
            500                 505                 510

Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
        515                 520                 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Xaa Xaa Xaa Glu
    530                 535                 540
```

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```
Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545                 550                 555                 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
                565                 570                 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Xaa Asp Ile Ser
            580                 585                 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
        595                 600                 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
    610                 615                 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625                 630                 635                 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly Xaa Gly
                645                 650                 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
            660                 665                 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
        675                 680                 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Xaa Asn Met Phe Ser
    690                 695                 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705                 710                 715                 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser
                725                 730                 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
            740                 745                 750
```

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```
Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
        755                 760                 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
    770                 775                 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785                 790                 795                 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
                805                 810                 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
            820                 825                 830

Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
        835                 840                 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
    850                 855                 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865                 870                 875                 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
                885                 890                 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
            900                 905                 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
        915                 920                 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
    930                 935                 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945                 950                 955                 960
```

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```
Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
               965                 970                 975

Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
            980                 985                 990

Ala Gln Leu Phe Ser Thr Gly Leu  Asn Thr Ile Tyr Asp  Ser Ile Gln
        995                 1000                1005

Leu Val  Asn Leu Ile Ser Asn  Ala Val Asn Asp Thr  Ile Asn Val
    1010                1015                1020

Leu Pro  Thr Ile Thr Glu Gly  Ile Pro Ile Val Ser  Thr Ile Leu
    1025                1030                1035

Asp Gly  Ile Asn Leu Gly Ala  Ala Ile Lys Glu Leu  Leu Asp Glu
    1040                1045                1050

His Asp  Pro Leu Leu Lys Lys  Glu Leu Glu Ala Lys  Val Gly Val
    1055                1060                1065

Leu Ala  Ile Asn Met Ser Leu  Ser Ile Ala Ala Thr  Val Ala Ser
    1070                1075                1080

Ile Val  Gly Ile Gly Ala Glu  Val Thr Ile Phe Leu  Leu Pro Ile
    1085                1090                1095

Ala Gly  Ile Ser Ala Gly Ile  Pro Ser Leu Val Asn  Asn Glu Leu
    1100                1105                1110

Ile Leu  His Asp Lys Ala Thr  Ser Val Val Asn Tyr  Phe Asn His
    1115                1120                1125

Leu Ser  Glu Ser Lys Lys Tyr  Gly Pro Leu Lys Thr  Glu Asp Asp
    1130                1135                1140

Lys Ile  Leu Val Pro Ile Asp  Asp Leu Val Ile Ser  Glu Ile Asp
    1145                1150                1155
```

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```
Phe Asn  Asn Asn Ser Ile Lys  Leu Gly Thr Cys Asn  Ile Leu Ala
    1160                1165                1170

Met Glu  Gly Gly Ser Gly His  Thr Val Thr Gly Asn  Ile Asp His
    1175                1180                1185

Phe Phe  Ser Ser Pro Ser Ile  Ser Ser His Ile Pro  Ser Leu Ser
    1190                1195                1200

Ile Tyr  Ser Ala Ile Gly Ile  Glu Thr Glu Asn Leu  Asp Phe Ser
    1205                1210                1215

Lys Lys  Ile Met Met Leu Pro  Asn Ala Pro Ser Arg  Val Phe Trp
    1220                1225                1230

Trp Glu  Thr Gly Ala Val Pro  Gly Leu Arg Ser Leu  Glu Asn Asp
    1235                1240                1245

Gly Thr  Arg Leu Leu Asp Ser  Ile Arg Asp Leu Tyr  Pro Gly Lys
    1250                1255                1260

Phe Tyr  Trp Arg Phe Tyr Ala  Phe Phe Asp Tyr Ala  Ile Thr Thr
    1265                1270                1275

Leu Lys  Pro Val Tyr Glu Asp  Thr Asn Ile Lys Ile  Lys Leu Asp
    1280                1285                1290

Lys Asp  Thr Arg Asn Phe Ile  Met Pro Thr Ile Thr  Thr Asn Glu
    1295                1300                1305

Ile Arg  Asn Lys Leu Ser Tyr  Ser Phe Asp Gly Ala  Gly Gly Thr
    1310                1315                1320

Tyr Ser  Leu Leu Leu Ser Ser  Tyr Pro Ile Ser Thr  Asn Ile Asn
    1325                1330                1335

Leu Ser  Lys Asp Asp Leu Trp  Ile Phe Asn Ile Asp  Asn Glu Val
    1340                1345                1350
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Arg Glu  Ile Ser Ile Glu Asn  Gly Thr Ile Lys Lys  Gly Lys Leu
    1355                1360                1365

Ile Lys  Asp Val Leu Ser Lys  Ile Asp Ile Asn Lys  Asn Lys Leu
    1370                1375                1380

Ile Ile  Gly Asn Gln Thr Ile  Asp Phe Ser Gly Asp  Ile Asp Asn
    1385                1390                1395

Lys Asp  Arg Tyr Ile Phe Leu  Thr Cys Glu Leu Asp  Asp Lys Ile
    1400                1405                1410

Ser Leu  Ile Ile Glu Ile Asn  Leu Val Ala Lys Ser  Tyr Ser Leu
    1415                1420                1425

Leu Leu  Ser Gly Asp Lys Asn  Tyr Leu Ile Ser Asn  Leu Ser Asn
    1430                1435                1440

Ile Ile  Glu Lys Ile Asn Thr  Leu Gly Leu Asp Ser  Lys Asn Ile
    1445                1450                1455

Ala Tyr  Asn Tyr Thr Asp Glu  Ser Asn Asn Lys Tyr  Phe Gly Ala
    1460                1465                1470

Ile Ser  Lys Thr Ser Gln Lys  Ser Ile Ile His Tyr  Lys Lys Asp
    1475                1480                1485

Ser Lys  Asn Ile Leu Glu Phe  Tyr Asn Asp Ser Thr  Leu Glu Phe
    1490                1495                1500

Asn Ser  Lys Asp Phe Ile Ala  Glu Asp Ile Asn Val  Phe Met Lys
    1505                1510                1515

Asp Asp  Ile Asn Thr Ile Thr  Gly Lys Tyr Tyr Val  Asp Asn Asn
    1520                1525                1530

Thr Asp  Lys Ser Ile Asp Phe  Ser Ile Ser Leu Val  Ser Lys Asn
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Gln Val  Lys Val Asn Gly Leu  Tyr Leu Asn Glu Ser  Val Tyr Ser
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Ser Tyr  Leu Asp Phe Val Lys  Asn Ser Asp Gly His  His Asn Thr
    1565                1570                1575

Ser Asn  Phe Met Asn Leu Phe  Leu Asp Asn Ile Ser  Phe Trp Lys
    1580                1585                1590

Leu Phe  Gly Phe Glu Asn Ile  Asn Phe Val Ile Asp  Lys Tyr Phe
    1595                1600                1605

Thr Leu  Val Gly Lys Thr Asn  Leu Gly Tyr Val Glu  Phe Ile Cys
    1610                1615                1620

Asp Asn  Asn Lys Asn Ile Asp  Ile Tyr Phe Gly Glu  Trp Lys Thr
    1625                1630                1635

Ser Ser  Ser Lys Ser Thr Ile  Phe Ser Gly Asn Gly  Arg Asn Val
    1640                1645                1650

Val Val  Glu Pro Ile Tyr Asn  Pro Asp Thr Gly Glu  Asp Ile Ser
    1655                1660                1665

Thr Ser  Leu Asp Phe Ser Tyr  Glu Pro Leu Tyr Gly  Ile Asp Arg
    1670                1675                1680

Tyr Ile  Asn Lys Val Leu Ile  Ala Pro Asp Leu Tyr  Thr Ser Leu
    1685                1690                1695

Ile Asn  Ile Asn Thr Asn Tyr  Tyr Ser Asn Glu Tyr  Tyr Pro Glu
    1700                1705                1710

Ile Ile  Val Leu Asn Pro Asn  Thr Phe His Lys Lys  Val Asn Ile
    1715                1720                1725

Asn Leu  Asp Ser Ser Ser Phe  Glu Tyr Lys Trp Ser  Thr Glu Gly
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Ser Asp  Phe Ile Leu Val Arg  Tyr Leu Glu Glu Ser  Asn Lys Lys
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Ile Leu  Gln Lys Ile Arg Ile  Lys Gly Ile Leu Ser  Asn Thr Gln
    1760                1765                1770

Ser Phe  Asn Lys Met Ser Ile  Asp Phe Lys Asp Ile  Lys Lys Leu
    1775                1780                1785

Ser Leu  Gly Tyr Ile Met Ser  Asn Phe Lys Ser Phe  Asn Ser Glu
    1790                1795                1800

Asn Glu  Leu Asp Arg Asp His  Leu Gly Phe Lys Ile  Ile Asp Asn
    1805                1810                1815

Lys Thr  Tyr Tyr Tyr Asp Glu  Asp Ser Lys Leu Val  Lys Gly Leu
    1820                1825                1830

Ile Asn  Ile Asn Asn Ser Leu  Phe Tyr Phe Asp Pro  Ile Glu Phe
    1835                1840                1845

Asn Leu  Val Thr Gly Trp Gln  Thr Ile Asn Gly Lys  Lys Tyr Tyr
    1850                1855                1860

Phe Asp  Ile Asn Thr Gly Ala  Ala Leu Ile Ser Tyr  Lys Ile Ile
    1865                1870                1875

Asn Gly  Lys His Phe Tyr Phe  Asn Asn Asp Gly Val  Met Gln Leu
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Gly Val  Phe Lys Gly Pro Asp  Gly Phe Glu Tyr Phe  Ala Pro Ala
    1895                1900                1905

Asn Thr  Gln Asn Asn Asn Ile  Glu Gly Gln Ala Ile  Val Tyr Gln
    1910                1915                1920

Ser Lys  Phe Leu Thr Leu Asn  Gly Lys Lys Tyr Tyr  Phe Asp Asn
    1925                1930                1935
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```
Asp Ser  Lys Ala Val Thr Gly  Trp Arg Ile Ile Asn  Asn Glu Lys
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Tyr Tyr  Phe Asn Pro Asn Asn  Ala Ile Ala Ala Val  Gly Leu Gln
    1955                1960                1965

Val Ile  Asp Asn Asn Lys Tyr  Tyr Phe Asn Pro Asp  Thr Ala Ile
    1970                1975                1980

Ile Ser  Lys Gly Trp Gln Thr  Val Asn Gly Ser Arg  Tyr Tyr Phe
    1985                1990                1995

Asp Thr  Asp Thr Ala Ile Ala  Phe Asn Gly Tyr Lys  Thr Ile Asp
    2000                2005                2010

Gly Lys  His Phe Tyr Phe Asp  Ser Asp Cys Val Val  Lys Ile Gly
    2015                2020                2025

Val Phe  Ser Thr Ser Asn Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2030                2035                2040

Thr Tyr  Asn Asn Asn Ile Glu  Gly Gln Ala Ile Val  Tyr Gln Ser
    2045                2050                2055

Lys Phe  Leu Thr Leu Asn Gly  Lys Lys Tyr Tyr Phe  Asp Asn Asn
    2060                2065                2070

Ser Lys  Ala Val Thr Gly Trp  Gln Thr Ile Asp Ser  Lys Lys Tyr
    2075                2080                2085

Tyr Phe  Asn Thr Asn Thr Ala  Glu Ala Ala Thr Gly  Trp Gln Thr
    2090                2095                2100

Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr Asn Thr  Ala Glu Ala
    2105                2110                2115

Ala Thr  Gly Trp Gln Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn
    2120                2125                2130
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Thr Asn  Thr Ala Ile Ala Ser  Thr Gly Tyr Thr Ile  Ile Asn Gly
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Lys His  Phe Tyr Phe Asn Thr  Asp Gly Ile Met Gln  Ile Gly Val
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Phe Lys  Gly Pro Asn Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr
    2165                2170                2175

Asp Ala  Asn Asn Ile Glu Gly  Gln Ala Ile Leu Tyr  Gln Asn Glu
    2180                2185                2190

Phe Leu  Thr Leu Asn Gly Lys  Lys Tyr Tyr Phe Gly  Ser Asp Ser
    2195                2200                2205

Lys Ala  Val Thr Gly Trp Arg  Ile Ile Asn Asn Lys  Lys Tyr Tyr
    2210                2215                2220

Phe Asn  Pro Asn Asn Ala Ile  Ala Ala Ile His Leu  Cys Thr Ile
    2225                2230                2235

Asn Asn  Asp Lys Tyr Tyr Phe  Ser Tyr Asp Gly Ile  Leu Gln Asn
    2240                2245                2250

Gly Tyr  Ile Thr Ile Glu Arg  Asn Asn Phe Tyr Phe  Asp Ala Asn
    2255                2260                2265

Asn Glu  Ser Lys Met Val Thr  Gly Val Phe Lys Gly  Pro Asn Gly
    2270                2275                2280

Phe Glu  Tyr Phe Ala Pro Ala  Asn Thr His Asn Asn  Asn Ile Glu
    2285                2290                2295

Gly Gln  Ala Ile Val Tyr Gln  Asn Lys Phe Leu Thr  Leu Asn Gly
    2300                2305                2310

Lys Lys  Tyr Tyr Phe Asp Asn  Asp Ser Lys Ala Val  Thr Gly Trp
    2315                2320                2325
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```
Gln Thr  Ile Asp Gly Lys Lys  Tyr Tyr Phe Asn Leu  Asn Thr Ala
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Glu Ala  Ala Thr Gly Trp Gln  Thr Ile Asp Gly Lys  Lys Tyr Tyr
    2345                2350                2355

Phe Asn  Leu Asn Thr Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile
    2360                2365                2370

Asp Gly  Lys Lys Tyr Tyr Phe  Asn Thr Asn Thr Phe  Ile Ala Ser
    2375                2380                2385

Thr Gly  Tyr Thr Ser Ile Asn  Gly Lys His Phe Tyr  Phe Asn Thr
    2390                2395                2400

Asp Gly  Ile Met Gln Ile Gly  Val Phe Lys Gly Pro  Asn Gly Phe
    2405                2410                2415

Glu Tyr  Phe Ala Pro Ala Asn  Thr His Asn Asn Asn  Ile Glu Gly
    2420                2425                2430

Gln Ala  Ile Leu Tyr Gln Asn  Lys Phe Leu Thr Leu  Asn Gly Lys
    2435                2440                2445

Lys Tyr  Tyr Phe Gly Ser Asp  Ser Lys Ala Val Thr  Gly Leu Arg
    2450                2455                2460

Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn Thr Asn  Thr Ala Val
    2465                2470                2475

Ala Val  Thr Gly Trp Gln Thr  Ile Asn Gly Lys Lys  Tyr Tyr Phe
    2480                2485                2490

Asn Thr  Asn Thr Ser Ile Ala  Ser Thr Gly Tyr Thr  Ile Ile Ser
    2495                2500                2505

Gly Lys  His Phe Tyr Phe Asn  Thr Asp Gly Ile Met  Gln Ile Gly
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Val Phe  Lys Gly Pro Asp Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
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Thr Asp  Ala Asn Asn Ile Glu  Gly Gln Ala Ile Arg  Tyr Gln Asn
    2540                2545                2550

Arg Phe  Leu Tyr Leu His Asp  Asn Ile Tyr Tyr Phe  Gly Asn Asn
    2555                2560                2565

Ser Lys  Ala Ala Thr Gly Trp  Val Thr Ile Asp Gly  Asn Arg Tyr
    2570                2575                2580

Tyr Phe  Glu Pro Asn Thr Ala  Met Gly Ala Asn Gly  Tyr Lys Thr
    2585                2590                2595

Ile Asp  Asn Lys Asn Phe Tyr  Phe Arg Asn Gly Leu  Pro Gln Ile
    2600                2605                2610

Gly Val  Phe Lys Gly Ser Asn  Gly Phe Glu Tyr Phe  Ala Pro Ala
    2615                2620                2625

Asn Thr  Asp Ala Asn Asn Ile  Glu Gly Gln Ala Ile  Arg Tyr Gln
    2630                2635                2640

Asn Arg  Phe Leu His Leu Leu  Gly Lys Ile Tyr Tyr  Phe Gly Asn
    2645                2650                2655

Asn Ser  Lys Ala Val Thr Gly  Trp Gln Thr Ile Asn  Gly Lys Val
    2660                2665                2670

Tyr Tyr  Phe Met Pro Asp Thr  Ala Met Ala Ala Ala  Gly Gly Leu
    2675                2680                2685

Phe Glu  Ile Asp Gly Val Ile  Tyr Phe Phe Gly Val  Asp Gly Val
    2690                2695                2700

Lys Ala  Pro Gly Ile Tyr Gly
    2705                2710
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20 25 30

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35 40 45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
50 55 60

Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65 70 75 80

Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys

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                85                  90                  95

Asn Leu His Phe Val Xaa Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
            100                 105                 110

Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
        115                 120                 125

Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
    130                 135                 140

Val Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145                 150                 155                 160

Leu Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met
                165                 170                 175

Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala
            180                 185                 190

Gln Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr
        195                 200                 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr
    210                 215                 220

Ile Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val
225                 230                 235                 240

Arg Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu
                245                 250                 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Xaa Ile Leu
            260                 265                 270

Xaa Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Xaa Val Xaa
        275                 280                 285

Met Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro
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290 295 300

Ser Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile
305 310 315 320

Met Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp
325 330 335

Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
340 345 350

Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala
355 360 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Xaa
370 375 380

Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val
385 390 395 400

Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro
405 410 415

Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile
420 425 430

Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met
435 440 445

Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Ala Val Ala Thr
450 455 460

Thr Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp
465 470 475 480

Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala
485 490 495

Asp Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr

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            500                 505                 510

Glu Gln Glu Met Ala Ser Leu Xaa Ser Phe Asp Asp Ala Arg Ala Lys
        515                 520                 525

Ala Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Xaa Xaa
    530                 535                 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu
545                 550                 555                 560

Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly
                565                 570                 575

Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Xaa Lys Ile Ser Tyr Glu
            580                 585                 590

Ala Ala Cys Asn Leu Phe Ala Xaa Thr Pro Tyr Asp Ser Val Leu Phe
        595                 600                 605

Gln Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly
    610                 615                 620

Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile
625                 630                 635                 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly Xaa Gly Lys Asp
                645                 650                 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser
            660                 665                 670

Thr Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro
        675                 680                 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Xaa Asn Met Phe Ser Tyr Ser
    690                 695                 700

Ile Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys
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705 710 715 720

Asp Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
725 730 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Xaa Arg
740 745 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
755 760 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
770 775 780

Asn Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785 790 795 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu
805 810 815

Glu Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
820 825 830

Asp Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr
835 840 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser
850 855 860

Ile Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp
865 870 875 880

Ser His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe
885 890 895

Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
900 905 910

Thr Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu

915 920 925

Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
930 935 940

Val Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn
945 950 955 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu
965 970 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
980 985 990

Leu Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp Ala Ala Lys Val Val
995 1000 1005

Glu Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu Pro
1010 1015 1020

Thr Leu Ser Glu Gly Leu Pro Ile Ile Ala Thr Ile Ile Asp Gly
1025 1030 1035

Val Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp
1040 1045 1050

Pro Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala
1055 1060 1065

Val Asn Leu Thr Thr Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu
1070 1075 1080

Gly Ile Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly
1085 1090 1095

Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu
1100 1105 1110

Arg Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Val Ser

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Leu Val  Glu Thr Glu Gly Val  Phe Thr Leu Leu Asp  Asp Lys Ile
    1130                1135                1140

Met Met  Pro Gln Asp Asp Leu  Val Ile Ser Glu Ile  Asp Phe Asn
    1145                1150                1155

Asn Asn  Ser Ile Val Leu Gly  Lys Cys Glu Ile Trp  Arg Met Glu
    1160                1165                1170

Gly Gly  Ser Gly His Thr Val  Thr Asp Asp Ile Asp  His Phe Phe
    1175                1180                1185

Ser Ala  Pro Ser Ile Thr Tyr  Arg Glu Pro His Leu  Ser Ile Tyr
    1190                1195                1200

Asp Val  Leu Glu Val Gln Lys  Glu Glu Leu Asp Leu  Ser Lys Asp
    1205                1210                1215

Leu Met  Val Leu Pro Asn Ala  Pro Asn Arg Val Phe  Ala Trp Glu
    1220                1225                1230

Thr Gly  Trp Thr Pro Gly Leu  Arg Ser Leu Glu Asn  Asp Gly Thr
    1235                1240                1245

Lys Leu  Leu Asp Arg Ile Arg  Asp Asn Tyr Glu Gly  Glu Phe Tyr
    1250                1255                1260

Trp Arg  Tyr Phe Ala Phe Ile  Ala Asp Ala Leu Ile  Thr Thr Leu
    1265                1270                1275

Lys Pro  Arg Tyr Glu Asp Thr  Asn Ile Arg Ile Asn  Leu Asp Ser
    1280                1285                1290

Asn Thr  Arg Ser Phe Ile Val  Pro Ile Ile Thr Thr  Glu Tyr Ile
    1295                1300                1305

Arg Glu  Lys Leu Ser Tyr Ser  Phe Tyr Gly Ser Gly  Gly Thr Tyr
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Ala Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu
1325 1330 1335

Ser Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg
1340 1345 1350

Asp Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile
1355 1360 1365

Glu Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile
1370 1375 1380

Leu Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser
1385 1390 1395

Asn Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn
1400 1405 1410

Ala Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu
1415 1420 1425

Ile Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile
1430 1435 1440

Gln Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys
1445 1450 1455

Asn Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly
1460 1465 1470

Phe Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu
1475 1480 1485

Pro Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys
1490 1495 1500

Pro Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val

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1505 1510 1515

Ile Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys
1520 1525 1530

Asp Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys
1535 1540 1545

Thr Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala
1550 1555 1560

Glu Ile Leu Lys Phe Met Asn Arg Lys Gly Asn Thr Asn Thr Ser
1565 1570 1575

Asp Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile
1580 1585 1590

Phe Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala
1595 1600 1605

Asn Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe
1610 1615 1620

Ile Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe
1625 1630 1635

Asn Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln
1640 1645 1650

Asn Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp
1655 1660 1665

Ile Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly
1670 1675 1680

Ile Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr
1685 1690 1695

Thr Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr

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1700 1705 1710

Tyr Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys
1715 1720 1725

Ile Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser
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Asn Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn
1745 1750 1755

Lys Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp
1760 1765 1770

Lys Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln
1775 1780 1785

Asp Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr
1790 1795 1800

Tyr Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu
1805 1810 1815

Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser
1820 1825 1830

Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro
1835 1840 1845

Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys
1850 1855 1860

Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu
1865 1870 1875

Thr Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val
1880 1885 1890

Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe

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1895 1900 1905

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile
1910 1915 1920

Asp Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe
1925 1930 1935

Asp Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly
1940 1945 1950

Glu Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly
1955 1960 1965

Leu Asn Gln Ile Gly Asp Tyr Lys Tyr Tyr Phe Asn Ser Asp Gly
1970 1975 1980

Val Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr
1985 1990 1995

Phe Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp
2000 2005 2010

Gly Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly
2015 2020 2025

Val Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn
2030 2035 2040

Glu Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly
2045 2050 2055

Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe
2060 2065 2070

Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr
2075 2080 2085

Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu

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2090 2095 2100

Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln
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Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp
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Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
2135 2140 2145

Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp
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Thr Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn
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Val Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu
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Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr
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Phe Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile
2225 2230 2235

Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr
2240 2245 2250

Gly Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn
2255 2260 2265

Gly Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe
2270 2275 2280

Tyr Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr

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2285 2290 2295

Pro Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu
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Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu
2315 2320 2325

Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr
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Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp
2345 2350 2355

Thr Ala Gln Leu Val Ile Ser Glu
2360 2365

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<211> 146
<212> PRT
<213> Artificial

<220>
<223> Synthetic amino acid sequence: variable light chain of A3-25 mAb IgE

<400> 36

Met Lys Leu Pro Val Arg Leu Leu Val Leu Met Phe Trp Ile Pro Gly
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Ser Ser Ser Asp Val Val Met Thr His Thr Pro Leu Ser Leu Pro Val
20 25 30

Ser Leu Gly Asp Gln Ala Ser Met Ser Cys Arg Ser Ser Gln Ser Leu
35 40 45

Ile His Ser Asn Gly Asn Thr Tyr Leu His Trp Tyr Leu Gln Lys Pro
50 55 60

Gly Gln Ser Pro Lys Leu Leu Ile Ser Lys Val Ser Asn Arg Phe Ser
65 70 75 80

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Gly Val Pro Asp Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe Thr
85 90 95

Leu Lys Ile Ser Arg Val Glu Ala Glu Asp Leu Gly Val Tyr Phe Cys
100 105 110

Ser Gln Thr Thr Tyr Phe Pro Tyr Thr Phe Gly Gly Gly Thr Arg Leu
115 120 125

Glu Ile Lys Arg Ala Asp Ala Ala Pro Thr Val Ser Ile Phe Pro Pro
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Ser Ser
145

<210> 37
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<212> PRT
<213> Artificial

<220>
<223> Synthetic amino acid sequence: variable heavy chain of A3-25 mAb IgE

<400> 37

Met Tyr Leu Gly Leu Asn Cys Val Phe Ile Val Phe Leu Leu Lys Gly
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Val Gln Ser Glu Val Asn Leu Glu Glu Ser Gly Gly Gly Leu Val Gln
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Pro Gly Gly Ser Met Lys Leu Ser Cys Val Ala Ser Gly Phe Thr Phe
35 40 45

Thr Asn Tyr Trp Met Asn Trp Val Arg Gln Ser Pro Glu Lys Gly Leu
50 55 60

Glu Trp Ile Ala Glu Ile Arg Leu Lys Ser His Asn Tyr Ala Thr His
65 70 75 80

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Phe Ala Glu Ser Val Lys Gly Arg Phe Thr Ile Ser Arg Asp Asp Ser
85 90 95

Lys Ser Ala Val Ser Leu Gln Met Thr Asn Leu Thr Pro Glu Asp Thr
100 105 110

Gly Ile Phe Tyr Cys Thr Trp Asp Tyr Tyr Gly Asn Pro Ala Phe Val
115 120 125

Tyr Trp Gly Gln Gly Thr Leu Val Thr Val Ser Ala Ala Ser Ile Arg
130 135 140

Asn Pro Gln Leu Tyr Pro Leu Lys Pro Cys Lys Gly Thr Ala Ser Met
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Thr Leu Gly Cys Leu Val Lys Asp Tyr Phe Pro Gly Pro Val Thr Val
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<210> 39
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<212> PRT
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<400> 39

Lys Val Ser Asn Arg Phe Ser
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<210> 41
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<212> PRT
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<400> 42

Glu Ile Arg Leu Lys Ser His Asn Tyr Ala Thr His Phe Ala Glu Ser
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Val Lys Gly

<210> 43
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<400> 43

Asp Tyr Tyr Gly Asn Pro Ala Phe Val Tyr
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35 40 45

Gly Arg Ile Asp Pro Ser Asn Ser Glu Ile Tyr Tyr Asn Gln Lys Phe
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Lys Asp Lys Ala Thr Leu Thr Val Asp Lys Ser Ser Ser Thr Ala Tyr
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Ile Gln Leu Ser Ser Leu Thr Ser Glu Asp Ser Ala Val Tyr Tyr Cys
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Ser Gly Ser Thr Leu Gln Ser Gly Ile Pro Ser Arg Phe Ser Gly Ser
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Arg Ser Gly Thr Asp Phe Thr Leu Ile Ile Ser Ser Leu Glu Pro Glu
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Asp Ser Ala Met Tyr Tyr Cys Gln Gln His Asn Glu Tyr Pro Leu Thr
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Trp Met His Trp Val Lys Gln Arg Pro Gly Gln Gly Leu Glu Trp Ile
35 40 45

Gly Val Ile Asn Pro Ser Asn Gly Arg Ser Thr Tyr Ser Glu Lys Phe
50 55 60

Lys Thr Thr Ala Thr Val Thr Val Asp Lys Ser Ser Ser Thr Ala Tyr
65 70 75 80

Met Gln Leu Ser Ile Leu Thr Ser Glu Asp Ser Ala Val Tyr Tyr Cys
85 90 95

Ala Arg Ala Tyr Tyr Ser Thr Ser Tyr Tyr Ala Met Asp Tyr Trp Gly
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Gly Tyr Thr Phe Thr Ser Tyr Trp Met His
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Gln Ala Ser Ile Ser Cys Arg Ser Ser Gln Asn Ile Val His Ser Asn
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Gly Asn Thr Tyr Leu Glu Trp Tyr Leu Gln Lys Pro Gly Gln Ser Pro
35 40 45

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Lys Leu Leu Ile Tyr Lys Val Ser Asn Arg Phe Ser Gly Val Pro Asp
50 55 60

Arg Phe Ser Gly Ser Gly Ser Gly Thr Tyr Phe Thr Leu Lys Ile Ser
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Arg Val Glu Ala Glu Asp Leu Gly Val Tyr Tyr Cys Phe Gln Gly Ser
85 90 95

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Pro Val Lys Leu Ser Cys Lys Ala Ser Gly Tyr Pro Phe Thr Asn Tyr
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35 40 45

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Gly Arg Ile Asp Pro Ser Asn Ser Glu Ile Tyr Tyr Asn Gln Lys Phe
50 55 60

Lys Asp Lys Ala Thr Leu Thr Val Asp Lys Ser Ser Ser Thr Ala Tyr
65 70 75 80

Ile Gln Leu Ser Ser Leu Thr Ser Glu Asp Ser Ala Val Tyr Tyr Cys
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Thr Leu Thr Val Ser Ser
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Thr Ile Thr Ile Asn Cys Arg Ala Ser Lys Ser Ile Ser Lys Tyr Leu
20 25 30

Ala Trp Tyr Gln Glu Lys Pro Gly Lys Thr Asn Lys Leu Leu Ile Tyr
35 40 45

Ser Gly Ser Thr Leu Gln Ser Gly Ile Pro Ser Arg Phe Ser Gly Ser
50 55 60

Arg Ser Gly Thr Asp Phe Thr Leu Ile Ile Ser Ser Leu Glu Pro Glu
65 70 75 80

Asp Ser Ala Met Tyr Tyr Cys Gln Gln His Asn Glu Tyr Pro Leu Thr
85 90 95

Phe Gly Ala Gly Thr Lys Leu Glu Leu Lys Arg Ala Asp Ala Ala Pro
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Gly Ala Gln Cys Asp
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Phe Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
            20                  25                  30


Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
        35                  40                  45


Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
    50                  55                  60


Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65                  70                  75                  80
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```
Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys
                85                  90                  95

Asn Leu His Phe Val Xaa Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
            100                 105                 110

Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
        115                 120                 125

Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
    130                 135                 140

Val Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145                 150                 155                 160

Leu Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met
                165                 170                 175

Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala
            180                 185                 190

Gln Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr
        195                 200                 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr
    210                 215                 220

Ile Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val
225                 230                 235                 240

Arg Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu
                245                 250                 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Xaa Ile Leu
            260                 265                 270

Xaa Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Xaa Val Xaa
        275                 280                 285
```

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```
Met Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro
    290                 295                 300

Ser Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile
305                 310                 315                 320

Met Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp
                325                 330                 335

Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
            340                 345                 350

Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala
        355                 360                 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Xaa
    370                 375                 380

Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val
385                 390                 395                 400

Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro
                405                 410                 415

Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile
            420                 425                 430

Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met
        435                 440                 445

Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Xaa Val Xaa Thr
    450                 455                 460

Thr Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp
465                 470                 475                 480

Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala
                485                 490                 495
```

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```
Asp Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr
            500                 505                 510

Glu Gln Glu Met Ala Ser Leu Xaa Ser Phe Asp Asp Ala Arg Ala Lys
        515                 520                 525

Ala Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Xaa Xaa
    530                 535                 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu
545                 550                 555                 560

Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly
                565                 570                 575

Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Xaa Lys Ile Ser Tyr Glu
            580                 585                 590

Ala Ala Cys Asn Leu Phe Ala Xaa Thr Pro Tyr Asp Ser Val Leu Phe
        595                 600                 605

Gln Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly
    610                 615                 620

Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile
625                 630                 635                 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly Xaa Gly Lys Asp
                645                 650                 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser
            660                 665                 670

Thr Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro
        675                 680                 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Xaa Asn Met Phe Ser Tyr Ser
    690                 695                 700
```

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```
Ile Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys
705                 710                 715                 720

Asp Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
                725                 730                 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Xaa Arg
            740                 745                 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
        755                 760                 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
    770                 775                 780

Asn Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785                 790                 795                 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu
                805                 810                 815

Glu Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
            820                 825                 830

Asp Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr
        835                 840                 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser
    850                 855                 860

Ile Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp
865                 870                 875                 880

Ser His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe
                885                 890                 895

Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
            900                 905                 910
```

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```
Thr Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu
        915                 920                 925

Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
    930                 935                 940

Val Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn
945                 950                 955                 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu
                965                 970                 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
            980                 985                 990

Leu Phe Ser Thr Gly Leu Asn Thr  Ile Thr Asp Ala Ala  Lys Val Val
        995                 1000                1005

Glu Leu  Val Ser Thr Ala Leu  Asp Glu Thr Ile Asp  Leu Leu Pro
    1010                1015                1020

Thr Leu  Ser Glu Gly Leu Pro  Ile Ile Ala Thr Ile  Ile Asp Gly
    1025                1030                1035

Val Ser  Leu Gly Ala Ala Ile  Lys Glu Leu Ser Glu  Thr Ser Asp
    1040                1045                1050

Pro Leu  Leu Arg Gln Glu Ile  Glu Ala Lys Ile Gly  Ile Met Ala
    1055                1060                1065

Val Asn  Leu Thr Thr Ala Thr  Thr Ala Ile Ile Thr  Ser Ser Leu
    1070                1075                1080

Gly Ile  Ala Ser Gly Phe Ser  Ile Leu Leu Val Pro  Leu Ala Gly
    1085                1090                1095

Ile Ser  Ala Gly Ile Pro Ser  Leu Val Asn Asn Glu  Leu Val Leu
    1100                1105                1110
```

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```
Arg Asp  Lys Ala Thr Lys Val  Val Asp Tyr Phe Lys  His Val Ser
    1115                1120                1125

Leu Val  Glu Thr Glu Gly Val  Phe Thr Leu Leu Asp  Asp Lys Ile
    1130                1135                1140

Met Met  Pro Gln Asp Asp Leu  Val Ile Ser Glu Ile  Asp Phe Asn
    1145                1150                1155

Asn Asn  Ser Ile Val Leu Gly  Lys Cys Glu Ile Trp  Arg Met Glu
    1160                1165                1170

Gly Gly  Ser Gly His Thr Val  Thr Asp Asp Ile Asp  His Phe Phe
    1175                1180                1185

Ser Ala  Pro Ser Ile Thr Tyr  Arg Glu Pro His Leu  Ser Ile Tyr
    1190                1195                1200

Asp Val  Leu Glu Val Gln Lys  Glu Glu Leu Asp Leu  Ser Lys Asp
    1205                1210                1215

Leu Met  Val Leu Pro Asn Ala  Pro Asn Arg Val Phe  Ala Trp Glu
    1220                1225                1230

Thr Gly  Trp Thr Pro Gly Leu  Arg Ser Leu Glu Asn  Asp Gly Thr
    1235                1240                1245

Lys Leu  Leu Asp Arg Ile Arg  Asp Asn Tyr Glu Gly  Glu Phe Tyr
    1250                1255                1260

Trp Arg  Tyr Phe Ala Phe Ile  Ala Asp Ala Leu Ile  Thr Thr Leu
    1265                1270                1275

Lys Pro  Arg Tyr Glu Asp Thr  Asn Ile Arg Ile Asn  Leu Asp Ser
    1280                1285                1290

Asn Thr  Arg Ser Phe Ile Val  Pro Ile Ile Thr Thr  Glu Tyr Ile
    1295                1300                1305
```

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```
Arg Glu  Lys Leu Ser Tyr Ser  Phe Tyr Gly Ser Gly  Gly Thr Tyr
    1310                 1315                 1320

Ala Leu  Ser Leu Ser Gln Tyr  Asn Met Gly Ile Asn  Ile Glu Leu
    1325                 1330                 1335

Ser Glu  Ser Asp Val Trp Ile  Ile Asp Val Asp Asn  Val Val Arg
    1340                 1345                 1350

Asp Val  Thr Ile Glu Ser Asp  Lys Ile Lys Lys Gly  Asp Leu Ile
    1355                 1360                 1365

Glu Gly  Ile Leu Ser Thr Leu  Ser Ile Glu Glu Asn  Lys Ile Ile
    1370                 1375                 1380

Leu Asn  Ser His Glu Ile Asn  Phe Ser Gly Glu Val  Asn Gly Ser
    1385                 1390                 1395

Asn Gly  Phe Val Ser Leu Thr  Phe Ser Ile Leu Glu  Gly Ile Asn
    1400                 1405                 1410

Ala Ile  Ile Glu Val Asp Leu  Leu Ser Lys Ser Tyr  Lys Leu Leu
    1415                 1420                 1425

Ile Ser  Gly Glu Leu Lys Ile  Leu Met Leu Asn Ser  Asn His Ile
    1430                 1435                 1440

Gln Gln  Lys Ile Asp Tyr Ile  Gly Phe Asn Ser Glu  Leu Gln Lys
    1445                 1450                 1455

Asn Ile  Pro Tyr Ser Phe Val  Asp Ser Glu Gly Lys  Glu Asn Gly
    1460                 1465                 1470

Phe Ile  Asn Gly Ser Thr Lys  Glu Gly Leu Phe Val  Ser Glu Leu
    1475                 1480                 1485

Pro Asp  Val Val Leu Ile Ser  Lys Val Tyr Met Asp  Asp Ser Lys
    1490                 1495                 1500
```

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Pro Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val
1505 1510 1515

Ile Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys
1520 1525 1530

Asp Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys
1535 1540 1545

Thr Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala
1550 1555 1560

Glu Ile Leu Lys Phe Met Asn Arg Lys Gly Asn Thr Asn Thr Ser
1565 1570 1575

Asp Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile
1580 1585 1590

Phe Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala
1595 1600 1605

Asn Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe
1610 1615 1620

Ile Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe
1625 1630 1635

Asn Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln
1640 1645 1650

Asn Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp
1655 1660 1665

Ile Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly
1670 1675 1680

Ile Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr
1685 1690 1695

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```
Thr Asp  Glu Ile Asn Ile Thr  Pro Val Tyr Glu Thr  Asn Asn Thr
    1700                1705                1710

Tyr Pro  Glu Val Ile Val Leu  Asp Ala Asn Tyr Ile  Asn Glu Lys
    1715                1720                1725

Ile Asn  Val Asn Ile Asn Asp  Leu Ser Ile Arg Tyr  Val Trp Ser
    1730                1735                1740

Asn Asp  Gly Asn Asp Phe Ile  Leu Met Ser Thr Ser  Glu Glu Asn
    1745                1750                1755

Lys Val  Ser Gln Val Lys Ile  Arg Phe Val Asn Val  Phe Lys Asp
    1760                1765                1770

Lys Thr  Leu Ala Asn Lys Leu  Ser Phe Asn Phe Ser  Asp Lys Gln
    1775                1780                1785

Asp Val  Pro Val Ser Glu Ile  Ile Leu Ser Phe Thr  Pro Ser Tyr
    1790                1795                1800

Tyr Glu  Asp Gly Leu Ile Gly  Tyr Asp Leu Gly Leu  Val Ser Leu
    1805                1810                1815

Tyr Asn  Glu Lys Phe Tyr Ile  Asn Asn Phe Gly Met  Met Val Ser
    1820                1825                1830

Gly Leu  Ile Tyr Ile Asn Asp  Ser Leu Tyr Tyr Phe  Lys Pro Pro
    1835                1840                1845

Val Asn  Asn Leu Ile Thr Gly  Phe Val Thr Val Gly  Asp Asp Lys
    1850                1855                1860

Tyr Tyr  Phe Asn Pro Ile Asn  Gly Gly Ala Ala Ser  Ile Gly Glu
    1865                1870                1875

Thr Ile  Ile Asp Asp Lys Asn  Tyr Tyr Phe Asn Gln  Ser Gly Val
    1880                1885                1890
```

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```
Leu Gln  Thr Gly Val Phe Ser  Thr Glu Asp Gly Phe  Lys Tyr Phe
    1895                 1900                 1905

Ala Pro  Ala Asn Thr Leu Asp  Glu Asn Leu Glu Gly  Glu Ala Ile
    1910                 1915                 1920

Asp Phe  Thr Gly Lys Leu Ile  Ile Asp Glu Asn Ile  Tyr Tyr Phe
    1925                 1930                 1935

Asp Asp  Asn Tyr Arg Gly Ala  Val Glu Trp Lys Glu  Leu Asp Gly
    1940                 1945                 1950

Glu Met  His Tyr Phe Ser Pro  Glu Thr Gly Lys Ala  Phe Lys Gly
    1955                 1960                 1965

Leu Asn  Gln Ile Gly Asp Tyr  Lys Tyr Tyr Phe Asn  Ser Asp Gly
    1970                 1975                 1980

Val Met  Gln Lys Gly Phe Val  Ser Ile Asn Asp Asn  Lys His Tyr
    1985                 1990                 1995

Phe Asp  Asp Ser Gly Val Met  Lys Val Gly Tyr Thr  Glu Ile Asp
    2000                 2005                 2010

Gly Lys  His Phe Tyr Phe Ala  Glu Asn Gly Glu Met  Gln Ile Gly
    2015                 2020                 2025

Val Phe  Asn Thr Glu Asp Gly  Phe Lys Tyr Phe Ala  His His Asn
    2030                 2035                 2040

Glu Asp  Leu Gly Asn Glu Glu  Gly Glu Glu Ile Ser  Tyr Ser Gly
    2045                 2050                 2055

Ile Leu  Asn Phe Asn Asn Lys  Ile Tyr Tyr Phe Asp  Asp Ser Phe
    2060                 2065                 2070

Thr Ala  Val Val Gly Trp Lys  Asp Leu Glu Asp Gly  Ser Lys Tyr
    2075                 2080                 2085
```

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```
Tyr Phe  Asp Glu Asp Thr Ala  Glu Ala Tyr Ile Gly  Leu Ser Leu
    2090                2095                2100

Ile Asn  Asp Gly Gln Tyr Tyr  Phe Asn Asp Asp Gly  Ile Met Gln
    2105                2110                2115

Val Gly  Phe Val Thr Ile Asn  Asp Lys Val Phe Tyr  Phe Ser Asp
    2120                2125                2130

Ser Gly  Ile Ile Glu Ser Gly  Val Gln Asn Ile Asp  Asp Asn Tyr
    2135                2140                2145

Phe Tyr  Ile Asp Asp Asn Gly  Ile Val Gln Ile Gly  Val Phe Asp
    2150                2155                2160

Thr Ser  Asp Gly Tyr Lys Tyr  Phe Ala Pro Ala Asn  Thr Val Asn
    2165                2170                2175

Asp Asn  Ile Tyr Gly Gln Ala  Val Glu Tyr Ser Gly  Leu Val Arg
    2180                2185                2190

Val Gly  Glu Asp Val Tyr Tyr  Phe Gly Glu Thr Tyr  Thr Ile Glu
    2195                2200                2205

Thr Gly  Trp Ile Tyr Asp Met  Glu Asn Glu Ser Asp  Lys Tyr Tyr
    2210                2215                2220

Phe Asn  Pro Glu Thr Lys Lys  Ala Cys Lys Gly Ile  Asn Leu Ile
    2225                2230                2235

Asp Asp  Ile Lys Tyr Tyr Phe  Asp Glu Lys Gly Ile  Met Arg Thr
    2240                2245                2250

Gly Leu  Ile Ser Phe Glu Asn  Asn Asn Tyr Tyr Phe  Asn Glu Asn
    2255                2260                2265

Gly Glu  Met Gln Phe Gly Tyr  Ile Asn Ile Glu Asp  Lys Met Phe
    2270                2275                2280
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Tyr Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr
2285 2290 2295

Pro Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu
2300 2305 2310

Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu
2315 2320 2325

Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr
2330 2335 2340

Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp
2345 2350 2355

Thr Ala Gln Leu Val Ile Ser Glu
2360 2365

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<211> 2709
<212> PRT
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<220>
<223> Synthetic amino acid sequence

<400> 83

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1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu

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65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
130 135 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145 150 155 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
165 170 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
180 185 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
195 200 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
210 215 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225 230 235 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Ala Ile Val Ala Leu
260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Ala Val Ala Met Leu

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275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Ala Ala Ala Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu

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485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
530 535 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545 550 555 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
565 570 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
580 585 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
595 600 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
610 615 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625 630 635 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
645 650 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
660 665 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
675 680 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr

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690 695 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705 710 715 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
725 730 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
740 745 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
755 760 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
770 775 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785 790 795 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
805 810 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
820 825 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
835 840 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
850 855 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865 870 875 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
885 890 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val

```
            900                 905                 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
        915                 920                 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
    930                 935                 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945                 950                 955                 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
                965                 970                 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
            980                 985                 990

Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Tyr Asp Ser  Ile Gln Leu
        995                 1000                1005

Val Asn  Leu Ile Ser Asn Ala  Val Asn Asp Thr Ile  Asn Val Leu
    1010                1015                1020

Pro Thr  Ile Thr Glu Gly Ile  Pro Ile Val Ser Thr  Ile Leu Asp
    1025                1030                1035

Gly Ile  Asn Leu Gly Ala Ala  Ile Lys Glu Leu Leu  Asp Glu His
    1040                1045                1050

Asp Pro  Leu Leu Lys Lys Glu  Leu Glu Ala Lys Val  Gly Val Leu
    1055                1060                1065

Ala Ile  Asn Met Ser Leu Ser  Ile Ala Ala Thr Val  Ala Ser Ile
    1070                1075                1080

Val Gly  Ile Gly Ala Glu Val  Thr Ile Phe Leu Leu  Pro Ile Ala
    1085                1090                1095

Gly Ile  Ser Ala Gly Ile Pro  Ser Leu Val Asn Asn  Glu Leu Ile
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```
    1100                1105                1110

Leu His  Asp Lys Ala Thr Ser  Val Val Asn Tyr Phe  Asn His Leu
    1115                1120                1125

Ser Glu  Ser Lys Lys Tyr Gly  Pro Leu Lys Thr Glu  Asp Asp Lys
    1130                1135                1140

Ile Leu  Val Pro Ile Asp Asp  Leu Val Ile Ser Glu  Ile Asp Phe
    1145                1150                1155

Asn Asn  Asn Ser Ile Lys Leu  Gly Thr Cys Asn Ile  Leu Ala Met
    1160                1165                1170

Glu Gly  Gly Ser Gly His Thr  Val Thr Gly Asn Ile  Asp His Phe
    1175                1180                1185

Phe Ser  Ser Pro Ser Ile Ser  Ser His Ile Pro Ser  Leu Ser Ile
    1190                1195                1200

Tyr Ser  Ala Ile Gly Ile Glu  Thr Glu Asn Leu Asp  Phe Ser Lys
    1205                1210                1215

Lys Ile  Met Met Leu Pro Asn  Ala Pro Ser Arg Val  Phe Trp Trp
    1220                1225                1230

Glu Thr  Gly Ala Val Pro Gly  Leu Arg Ser Leu Glu  Asn Asp Gly
    1235                1240                1245

Thr Arg  Leu Leu Asp Ser Ile  Arg Asp Leu Tyr Pro  Gly Lys Phe
    1250                1255                1260

Tyr Trp  Arg Phe Tyr Ala Phe  Phe Asp Tyr Ala Ile  Thr Thr Leu
    1265                1270                1275

Lys Pro  Val Tyr Glu Asp Thr  Asn Ile Lys Ile Lys  Leu Asp Lys
    1280                1285                1290

Asp Thr  Arg Asn Phe Ile Met  Pro Thr Ile Thr Thr  Asn Glu Ile
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1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile
1355 1360 1365

Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Ile
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe Asn

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1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile

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1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Ile Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly

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1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr

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2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe

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2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
2330 2335 2340

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala

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2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr

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2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

<210> 84
<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 84

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

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Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320
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Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525
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```
Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
    530                 535                 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545                 550                 555                 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
        595                 600                 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
    610                 615                 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625                 630                 635                 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
                645                 650                 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
            660                 665                 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
        675                 680                 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
    690                 695                 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705                 710                 715                 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
                725                 730                 735
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```
Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
            740                 745                 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
        755                 760                 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
    770                 775                 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785                 790                 795                 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
                805                 810                 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
            820                 825                 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
        835                 840                 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
    850                 855                 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865                 870                 875                 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
                885                 890                 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
            900                 905                 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
        915                 920                 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
    930                 935                 940
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```
Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945                 950                 955                 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
                965                 970                 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
            980                 985                 990

Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Tyr Asp Ser  Ile Gln Leu
        995                 1000                1005

Val Asn  Leu Ile Ser Asn Ala  Val Asn Asp Thr Ile  Asn Val Leu
    1010                1015                1020

Pro Thr  Ile Thr Glu Gly Ile  Pro Ile Val Ser Thr  Ile Leu Asp
    1025                1030                1035

Gly Ile  Asn Leu Gly Ala Ala  Ile Lys Glu Leu Leu  Asp Glu His
    1040                1045                1050

Asp Pro  Leu Leu Lys Lys Glu  Leu Glu Ala Lys Val  Gly Val Leu
    1055                1060                1065

Ala Ile  Asn Met Ser Leu Ser  Ile Ala Ala Thr Val  Ala Ser Ile
    1070                1075                1080

Val Gly  Ile Gly Ala Glu Val  Thr Ile Phe Leu Leu  Pro Ile Ala
    1085                1090                1095

Gly Ile  Ser Ala Gly Ile Pro  Ser Leu Val Asn Asn  Glu Leu Ile
    1100                1105                1110

Leu His  Asp Lys Ala Thr Ser  Val Val Asn Tyr Phe  Asn His Leu
    1115                1120                1125

Ser Glu  Ser Lys Lys Tyr Gly  Pro Leu Lys Thr Glu  Asp Asp Lys
    1130                1135                1140
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Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly
1235 1240 1245

Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
1325 1330 1335

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```
Ser Lys  Asp Asp Leu Trp Ile  Phe Asn Ile Asp Asn  Glu Val Arg
    1340                1345                1350

Glu Ile  Ser Ile Glu Asn Gly  Thr Ile Lys Lys Gly  Lys Leu Ile
    1355                1360                1365

Lys Asp  Val Leu Ser Lys Ile  Asp Ile Asn Lys Asn  Lys Leu Ile
    1370                1375                1380

Ile Gly  Asn Gln Thr Ile Asp  Phe Ser Gly Asp Ile  Asp Asn Lys
    1385                1390                1395

Asp Arg  Tyr Ile Phe Leu Thr  Cys Glu Leu Asp Asp  Lys Ile Ser
    1400                1405                1410

Leu Ile  Ile Glu Ile Asn Leu  Val Ala Lys Ser Tyr  Ser Leu Leu
    1415                1420                1425

Leu Ser  Gly Asp Lys Asn Tyr  Leu Ile Ser Asn Leu  Ser Asn Ile
    1430                1435                1440

Ile Glu  Lys Ile Asn Thr Leu  Gly Leu Asp Ser Lys  Asn Ile Ala
    1445                1450                1455

Tyr Asn  Tyr Thr Asp Glu Ser  Asn Asn Lys Tyr Phe  Gly Ala Ile
    1460                1465                1470

Ser Lys  Thr Ser Gln Lys Ser  Ile Ile His Tyr Lys  Lys Asp Ser
    1475                1480                1485

Lys Asn  Ile Leu Glu Phe Tyr  Asn Asp Ser Thr Leu  Glu Phe Asn
    1490                1495                1500

Ser Lys  Asp Phe Ile Ala Glu  Asp Ile Asn Val Phe  Met Lys Asp
    1505                1510                1515

Asp Ile  Asn Thr Ile Thr Gly  Lys Tyr Tyr Val Asp  Asn Asn Thr
    1520                1525                1530
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```
Asp Lys  Ser Ile Asp Phe Ser  Ile Ser Leu Val Ser  Lys Asn Gln
    1535                1540                1545

Val Lys  Val Asn Gly Leu Tyr  Leu Asn Glu Ser Val  Tyr Ser Ser
    1550                1555                1560

Tyr Leu  Asp Phe Val Lys Asn  Ser Asp Gly His His  Asn Thr Ser
    1565                1570                1575

Asn Phe  Met Asn Leu Phe Leu  Asp Asn Ile Ser Phe  Trp Lys Leu
    1580                1585                1590

Phe Gly  Phe Glu Asn Ile Asn  Phe Val Ile Asp Lys  Tyr Phe Thr
    1595                1600                1605

Leu Val  Gly Lys Thr Asn Leu  Gly Tyr Val Glu Phe  Ile Cys Asp
    1610                1615                1620

Asn Asn  Lys Asn Ile Asp Ile  Tyr Phe Gly Glu Trp  Lys Thr Ser
    1625                1630                1635

Ser Ser  Lys Ser Thr Ile Phe  Ser Gly Asn Gly Arg  Asn Val Val
    1640                1645                1650

Val Glu  Pro Ile Tyr Asn Pro  Asp Thr Gly Glu Asp  Ile Ser Thr
    1655                1660                1665

Ser Leu  Asp Phe Ser Tyr Glu  Pro Leu Tyr Gly Ile  Asp Arg Tyr
    1670                1675                1680

Ile Asn  Lys Val Leu Ile Ala  Pro Asp Leu Tyr Thr  Ser Leu Ile
    1685                1690                1695

Asn Ile  Asn Thr Asn Tyr Tyr  Ser Asn Glu Tyr Tyr  Pro Glu Ile
    1700                1705                1710

Ile Val  Leu Asn Pro Asn Thr  Phe His Lys Lys Val  Asn Ile Asn
    1715                1720                1725
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Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Ile Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

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```
Lys Phe  Leu Thr Leu Asn Gly  Lys Lys Tyr Tyr Phe  Asp Asn Asp
    1925                1930                1935

Ser Lys  Ala Val Thr Gly Trp  Arg Ile Ile Asn Asn  Glu Lys Tyr
    1940                1945                1950

Tyr Phe  Asn Pro Asn Asn Ala  Ile Ala Ala Val Gly  Leu Gln Val
    1955                1960                1965

Ile Asp  Asn Asn Lys Tyr Tyr  Phe Asn Pro Asp Thr  Ala Ile Ile
    1970                1975                1980

Ser Lys  Gly Trp Gln Thr Val  Asn Gly Ser Arg Tyr  Tyr Phe Asp
    1985                1990                1995

Thr Asp  Thr Ala Ile Ala Phe  Asn Gly Tyr Lys Thr  Ile Asp Gly
    2000                2005                2010

Lys His  Phe Tyr Phe Asp Ser  Asp Cys Val Val Lys  Ile Gly Val
    2015                2020                2025

Phe Ser  Thr Ser Asn Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr
    2030                2035                2040

Tyr Asn  Asn Asn Ile Glu Gly  Gln Ala Ile Val Tyr  Gln Ser Lys
    2045                2050                2055

Phe Leu  Thr Leu Asn Gly Lys  Lys Tyr Tyr Phe Asp  Asn Asn Ser
    2060                2065                2070

Lys Ala  Val Thr Gly Trp Gln  Thr Ile Asp Ser Lys  Lys Tyr Tyr
    2075                2080                2085

Phe Asn  Thr Asn Thr Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile
    2090                2095                2100

Asp Gly  Lys Lys Tyr Tyr Phe  Asn Thr Asn Thr Ala  Glu Ala Ala
    2105                2110                2115
```

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```
Thr Gly  Trp Gln Thr Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr
    2120                2125                2130

Asn Thr  Ala Ile Ala Ser Thr  Gly Tyr Thr Ile Ile  Asn Gly Lys
    2135                2140                2145

His Phe  Tyr Phe Asn Thr Asp  Gly Ile Met Gln Ile  Gly Val Phe
    2150                2155                2160

Lys Gly  Pro Asn Gly Phe Glu  Tyr Phe Ala Pro Ala  Asn Thr Asp
    2165                2170                2175

Ala Asn  Asn Ile Glu Gly Gln  Ala Ile Leu Tyr Gln  Asn Glu Phe
    2180                2185                2190

Leu Thr  Leu Asn Gly Lys Lys  Tyr Tyr Phe Gly Ser  Asp Ser Lys
    2195                2200                2205

Ala Val  Thr Gly Trp Arg Ile  Ile Asn Asn Lys Lys  Tyr Tyr Phe
    2210                2215                2220

Asn Pro  Asn Asn Ala Ile Ala  Ala Ile His Leu Cys  Thr Ile Asn
    2225                2230                2235

Asn Asp  Lys Tyr Tyr Phe Ser  Tyr Asp Gly Ile Leu  Gln Asn Gly
    2240                2245                2250

Tyr Ile  Thr Ile Glu Arg Asn  Asn Phe Tyr Phe Asp  Ala Asn Asn
    2255                2260                2265

Glu Ser  Lys Met Val Thr Gly  Val Phe Lys Gly Pro  Asn Gly Phe
    2270                2275                2280

Glu Tyr  Phe Ala Pro Ala Asn  Thr His Asn Asn Asn  Ile Glu Gly
    2285                2290                2295

Gln Ala  Ile Val Tyr Gln Asn  Lys Phe Leu Thr Leu  Asn Gly Lys
    2300                2305                2310
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Lys Tyr  Tyr Phe Asp Asn Asp  Ser Lys Ala Val Thr  Gly Trp Gln
    2315                 2320                 2325

Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn Leu Asn  Thr Ala Glu
    2330                 2335                 2340

Ala Ala  Thr Gly Trp Gln Thr  Ile Asp Gly Lys Lys  Tyr Tyr Phe
    2345                 2350                 2355

Asn Leu  Asn Thr Ala Glu Ala  Ala Thr Gly Trp Gln  Thr Ile Asp
    2360                 2365                 2370

Gly Lys  Lys Tyr Tyr Phe Asn  Thr Asn Thr Phe Ile  Ala Ser Thr
    2375                 2380                 2385

Gly Tyr  Thr Ser Ile Asn Gly  Lys His Phe Tyr Phe  Asn Thr Asp
    2390                 2395                 2400

Gly Ile  Met Gln Ile Gly Val  Phe Lys Gly Pro Asn  Gly Phe Glu
    2405                 2410                 2415

Tyr Phe  Ala Pro Ala Asn Thr  His Asn Asn Asn Ile  Glu Gly Gln
    2420                 2425                 2430

Ala Ile  Leu Tyr Gln Asn Lys  Phe Leu Thr Leu Asn  Gly Lys Lys
    2435                 2440                 2445

Tyr Tyr  Phe Gly Ser Asp Ser  Lys Ala Val Thr Gly  Leu Arg Thr
    2450                 2455                 2460

Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr Asn Thr  Ala Val Ala
    2465                 2470                 2475

Val Thr  Gly Trp Gln Thr Ile  Asn Gly Lys Lys Tyr  Tyr Phe Asn
    2480                 2485                 2490

Thr Asn  Thr Ser Ile Ala Ser  Thr Gly Tyr Thr Ile  Ile Ser Gly
    2495                 2500                 2505
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Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

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Ala Pro Gly Ile Tyr Gly
2705

<210> 85
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 85

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Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
130 135 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu

145 150 155 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
165 170 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
180 185 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
195 200 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
210 215 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225 230 235 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Ala Ile Leu Ala
260 265 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Ala Val Ala Met
275 280 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
290 295 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser

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355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Ala Val Ala Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
530 535 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545 550 555 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr

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565 570 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
580 585 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
595 600 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
610 615 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625 630 635 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
645 650 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
660 665 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
675 680 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
690 695 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705 710 715 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
725 730 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
740 745 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
755 760 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn

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770 775 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785 790 795 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
805 810 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
820 825 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
835 840 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
850 855 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865 870 875 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
885 890 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
900 905 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
915 920 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
930 935 940

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945 950 955 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
965 970 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu

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980 985 990

Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp Ala Ala Lys Val Val Glu
995 1000 1005

Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu Pro Thr
1010 1015 1020

Leu Ser Glu Gly Leu Pro Ile Ile Ala Thr Ile Ile Asp Gly Val
1025 1030 1035

Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp Pro
1040 1045 1050

Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala Val
1055 1060 1065

Asn Leu Thr Thr Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu Gly
1070 1075 1080

Ile Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile
1085 1090 1095

Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg
1100 1105 1110

Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Val Ser Leu
1115 1120 1125

Val Glu Thr Glu Gly Val Phe Thr Leu Leu Asp Asp Lys Ile Met
1130 1135 1140

Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe Ser

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1175 1180 1185

Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile Leu

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1370 1375 1380

Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys Thr
1535 1540 1545

Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Arg Lys Gly Asn Thr Asn Thr Ser Asp

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1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe
1580 1585 1590

Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys

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1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu

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1955 1960 1965

Asn Gln Ile Gly Asp Tyr Lys Tyr Tyr Phe Asn Ser Asp Gly Val
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr

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2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr

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2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 86
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 86

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
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Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
130 135 140

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Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350
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Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545                 550                 555                 560
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Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
565 570 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
580 585 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
595 600 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
610 615 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625 630 635 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
645 650 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
660 665 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
675 680 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
690 695 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705 710 715 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
725 730 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
740 745 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
755 760 765

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```
Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
    770                 775                 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785                 790                 795                 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
                805                 810                 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
            820                 825                 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
        835                 840                 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
    850                 855                 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865                 870                 875                 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
                885                 890                 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
        915                 920                 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
                965                 970                 975
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```
Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Ile  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050

Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
    1055                1060                1065

Asn Leu  Thr Thr Ala Thr Thr  Ala Ile Ile Thr Ser  Ser Leu Gly
    1070                1075                1080

Ile Ala  Ser Gly Phe Ser Ile  Leu Leu Val Pro Leu  Ala Gly Ile
    1085                1090                1095

Ser Ala  Gly Ile Pro Ser Leu  Val Asn Asn Glu Leu  Val Leu Arg
    1100                1105                1110

Asp Lys  Ala Thr Lys Val Val  Asp Tyr Phe Lys His  Val Ser Leu
    1115                1120                1125

Val Glu  Thr Glu Gly Val Phe  Thr Leu Leu Asp Asp  Lys Ile Met
    1130                1135                1140

Met Pro  Gln Asp Asp Leu Val  Ile Ser Glu Ile Asp  Phe Asn Asn
    1145                1150                1155

Asn Ser  Ile Val Leu Gly Lys  Cys Glu Ile Trp Arg  Met Glu Gly
    1160                1165                1170
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```
Gly Ser  Gly His Thr Val Thr  Asp Asp Ile Asp His  Phe Phe Ser
    1175                1180                1185

Ala Pro  Ser Ile Thr Tyr Arg  Glu Pro His Leu Ser  Ile Tyr Asp
    1190                1195                1200

Val Leu  Glu Val Gln Lys Glu  Glu Leu Asp Leu Ser  Lys Asp Leu
    1205                1210                1215

Met Val  Leu Pro Asn Ala Pro  Asn Arg Val Phe Ala  Trp Glu Thr
    1220                1225                1230

Gly Trp  Thr Pro Gly Leu Arg  Ser Leu Glu Asn Asp  Gly Thr Lys
    1235                1240                1245

Leu Leu  Asp Arg Ile Arg Asp  Asn Tyr Glu Gly Glu  Phe Tyr Trp
    1250                1255                1260

Arg Tyr  Phe Ala Phe Ile Ala  Asp Ala Leu Ile Thr  Thr Leu Lys
    1265                1270                1275

Pro Arg  Tyr Glu Asp Thr Asn  Ile Arg Ile Asn Leu  Asp Ser Asn
    1280                1285                1290

Thr Arg  Ser Phe Ile Val Pro  Ile Ile Thr Thr Glu  Tyr Ile Arg
    1295                1300                1305

Glu Lys  Leu Ser Tyr Ser Phe  Tyr Gly Ser Gly Gly  Thr Tyr Ala
    1310                1315                1320

Leu Ser  Leu Ser Gln Tyr Asn  Met Gly Ile Asn Ile  Glu Leu Ser
    1325                1330                1335

Glu Ser  Asp Val Trp Ile Ile  Asp Val Asp Asn Val  Val Arg Asp
    1340                1345                1350

Val Thr  Ile Glu Ser Asp Lys  Ile Lys Lys Gly Asp  Leu Ile Glu
    1355                1360                1365
```

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```
Gly Ile  Leu Ser Thr Leu Ser  Ile Glu Glu Asn Lys  Ile Ile Leu
    1370                1375                1380

Asn Ser  His Glu Ile Asn Phe  Ser Gly Glu Val Asn  Gly Ser Asn
    1385                1390                1395

Gly Phe  Val Ser Leu Thr Phe  Ser Ile Leu Glu Gly  Ile Asn Ala
    1400                1405                1410

Ile Ile  Glu Val Asp Leu Leu  Ser Lys Ser Tyr Lys  Leu Leu Ile
    1415                1420                1425

Ser Gly  Glu Leu Lys Ile Leu  Met Leu Asn Ser Asn  His Ile Gln
    1430                1435                1440

Gln Lys  Ile Asp Tyr Ile Gly  Phe Asn Ser Glu Leu  Gln Lys Asn
    1445                1450                1455

Ile Pro  Tyr Ser Phe Val Asp  Ser Glu Gly Lys Glu  Asn Gly Phe
    1460                1465                1470

Ile Asn  Gly Ser Thr Lys Glu  Gly Leu Phe Val Ser  Glu Leu Pro
    1475                1480                1485

Asp Val  Val Leu Ile Ser Lys  Val Tyr Met Asp Asp  Ser Lys Pro
    1490                1495                1500

Ser Phe  Gly Tyr Tyr Ser Asn  Asn Leu Lys Asp Val  Lys Val Ile
    1505                1510                1515

Thr Lys  Asp Asn Val Asn Ile  Leu Thr Gly Tyr Tyr  Leu Lys Asp
    1520                1525                1530

Asp Ile  Lys Ile Ser Leu Ser  Leu Thr Leu Gln Asp  Glu Lys Thr
    1535                1540                1545

Ile Lys  Leu Asn Ser Val His  Leu Asp Glu Ser Gly  Val Ala Glu
    1550                1555                1560
```

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```
Ile Leu  Lys Phe Met Asn Arg  Lys Gly Asn Thr Asn  Thr Ser Asp
    1565                1570                1575

Ser Leu  Met Ser Phe Leu Glu  Ser Met Asn Ile Lys  Ser Ile Phe
    1580                1585                1590

Val Asn  Phe Leu Gln Ser Asn  Ile Lys Phe Ile Leu  Asp Ala Asn
    1595                1600                1605

Phe Ile  Ile Ser Gly Thr Thr  Ser Ile Gly Gln Phe  Glu Phe Ile
    1610                1615                1620

Cys Asp  Glu Asn Asp Asn Ile  Gln Pro Tyr Phe Ile  Lys Phe Asn
    1625                1630                1635

Thr Leu  Glu Thr Asn Tyr Thr  Leu Tyr Val Gly Asn  Arg Gln Asn
    1640                1645                1650

Met Ile  Val Glu Pro Asn Tyr  Asp Leu Asp Asp Ser  Gly Asp Ile
    1655                1660                1665

Ser Ser  Thr Val Ile Asn Phe  Ser Gln Lys Tyr Leu  Tyr Gly Ile
    1670                1675                1680

Asp Ser  Cys Val Asn Lys Val  Val Ile Ser Pro Asn  Ile Tyr Thr
    1685                1690                1695

Asp Glu  Ile Asn Ile Thr Pro  Val Tyr Glu Thr Asn  Asn Thr Tyr
    1700                1705                1710

Pro Glu  Val Ile Val Leu Asp  Ala Asn Tyr Ile Asn  Glu Lys Ile
    1715                1720                1725

Asn Val  Asn Ile Asn Asp Leu  Ser Ile Arg Tyr Val  Trp Ser Asn
    1730                1735                1740

Asp Gly  Asn Asp Phe Ile Leu  Met Ser Thr Ser Glu  Glu Asn Lys
    1745                1750                1755
```

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Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

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```
Met His  Tyr Phe Ser Pro Glu  Thr Gly Lys Ala Phe  Lys Gly Leu
    1955                1960                1965

Asn Gln  Ile Gly Asp Tyr Lys  Tyr Tyr Phe Asn Ser  Asp Gly Val
    1970                1975                1980

Met Gln  Lys Gly Phe Val Ser  Ile Asn Asp Asn Lys  His Tyr Phe
    1985                1990                1995

Asp Asp  Ser Gly Val Met Lys  Val Gly Tyr Thr Glu  Ile Asp Gly
    2000                2005                2010

Lys His  Phe Tyr Phe Ala Glu  Asn Gly Glu Met Gln  Ile Gly Val
    2015                2020                2025

Phe Asn  Thr Glu Asp Gly Phe  Lys Tyr Phe Ala His  His Asn Glu
    2030                2035                2040

Asp Leu  Gly Asn Glu Glu Gly  Glu Glu Ile Ser Tyr  Ser Gly Ile
    2045                2050                2055

Leu Asn  Phe Asn Asn Lys Ile  Tyr Tyr Phe Asp Asp  Ser Phe Thr
    2060                2065                2070

Ala Val  Val Gly Trp Lys Asp  Leu Glu Asp Gly Ser  Lys Tyr Tyr
    2075                2080                2085

Phe Asp  Glu Asp Thr Ala Glu  Ala Tyr Ile Gly Leu  Ser Leu Ile
    2090                2095                2100

Asn Asp  Gly Gln Tyr Tyr Phe  Asn Asp Asp Gly Ile  Met Gln Val
    2105                2110                2115

Gly Phe  Val Thr Ile Asn Asp  Lys Val Phe Tyr Phe  Ser Asp Ser
    2120                2125                2130

Gly Ile  Ile Glu Ser Gly Val  Gln Asn Ile Asp Asp  Asn Tyr Phe
    2135                2140                2145
```

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Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

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Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 87
<211> 2710
<212> PRT
<213> Clostridium difficile

<400> 87

Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1 5 10 15

Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
20 25 30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
35 40 45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn
50 55 60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65 70 75 80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
100 105 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
115 120 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
130 135 140

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```
Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Pro Arg Pro Ser
    290                 295                 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
                325                 330                 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
            340                 345                 350
```

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```
Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
        355                 360                 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
    370                 375                 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385                 390                 395                 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
                405                 410                 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
            420                 425                 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
        435                 440                 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
    450                 455                 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465                 470                 475                 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
                485                 490                 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
            500                 505                 510

Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
        515                 520                 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
    530                 535                 540

Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545                 550                 555                 560
```

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```
Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
                565                 570                 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
            580                 585                 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
        595                 600                 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
    610                 615                 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625                 630                 635                 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
                645                 650                 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
            660                 665                 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
        675                 680                 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
    690                 695                 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705                 710                 715                 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser
                725                 730                 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
            740                 745                 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
        755                 760                 765
```

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```
Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
    770                 775                 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785                 790                 795                 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
                805                 810                 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
            820                 825                 830

Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
        835                 840                 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
    850                 855                 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865                 870                 875                 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
                885                 890                 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
            900                 905                 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
        915                 920                 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
    930                 935                 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945                 950                 955                 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
                965                 970                 975
```

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```
Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
            980                 985                 990

Ala Gln Leu Phe Ser Thr Gly Leu  Asn Thr Ile Tyr Asp  Ser Ile Gln
        995                 1000                1005

Leu Val  Asn Leu Ile Ser Asn  Ala Val Asn Asp Thr  Ile Asn Val
    1010                1015                1020

Leu Pro  Thr Ile Thr Glu Gly  Ile Pro Ile Val Ser  Thr Ile Leu
    1025                1030                1035

Asp Gly  Ile Asn Leu Gly Ala  Ala Ile Lys Glu Leu  Leu Asp Glu
    1040                1045                1050

His Asp  Pro Leu Leu Lys Lys  Glu Leu Glu Ala Lys  Val Gly Val
    1055                1060                1065

Leu Ala  Ile Asn Met Ser Leu  Ser Ile Ala Ala Thr  Val Ala Ser
    1070                1075                1080

Ile Val  Gly Ile Gly Ala Glu  Val Thr Ile Phe Leu  Leu Pro Ile
    1085                1090                1095

Ala Gly  Ile Ser Ala Gly Ile  Pro Ser Leu Val Asn  Asn Glu Leu
    1100                1105                1110

Ile Leu  His Asp Lys Ala Thr  Ser Val Val Asn Tyr  Phe Asn His
    1115                1120                1125

Leu Ser  Glu Ser Lys Glu Tyr  Gly Pro Leu Lys Thr  Glu Asp Asp
    1130                1135                1140

Lys Ile  Leu Val Pro Ile Asp  Asp Leu Val Ile Ser  Glu Ile Asp
    1145                1150                1155

Phe Asn  Asn Asn Ser Ile Lys  Leu Gly Thr Cys Asn  Ile Leu Ala
    1160                1165                1170
```

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```
Met Glu  Gly Gly Ser Gly His  Thr Val Thr Gly Asn  Ile Asp His
    1175                1180                1185

Phe Phe  Ser Ser Pro Tyr Ile  Ser Ser His Ile Pro  Ser Leu Ser
    1190                1195                1200

Val Tyr  Ser Ala Ile Gly Ile  Lys Thr Glu Asn Leu  Asp Phe Ser
    1205                1210                1215

Lys Lys  Ile Met Met Leu Pro  Asn Ala Pro Ser Arg  Val Phe Trp
    1220                1225                1230

Trp Glu  Thr Gly Ala Val Pro  Gly Leu Arg Ser Leu  Glu Asn Asn
    1235                1240                1245

Gly Thr  Lys Leu Leu Asp Ser  Ile Arg Asp Leu Tyr  Pro Gly Lys
    1250                1255                1260

Phe Tyr  Trp Arg Phe Tyr Ala  Phe Phe Asp Tyr Ala  Ile Thr Thr
    1265                1270                1275

Leu Lys  Pro Val Tyr Glu Asp  Thr Asn Thr Lys Ile  Lys Leu Asp
    1280                1285                1290

Lys Asp  Thr Arg Asn Phe Ile  Met Pro Thr Ile Thr  Thr Asp Glu
    1295                1300                1305

Ile Arg  Asn Lys Leu Ser Tyr  Ser Phe Asp Gly Ala  Gly Gly Thr
    1310                1315                1320

Tyr Ser  Leu Leu Leu Ser Ser  Tyr Pro Ile Ser Met  Asn Ile Asn
    1325                1330                1335

Leu Ser  Lys Asp Asp Leu Trp  Ile Phe Asn Ile Asp  Asn Glu Val
    1340                1345                1350

Arg Glu  Ile Ser Ile Glu Asn  Gly Thr Ile Lys Lys  Gly Asn Leu
    1355                1360                1365
```

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```
Ile Glu  Asp Val Leu Ser Lys  Ile Asp Ile Asn Lys  Asn Lys Leu
    1370                1375                1380

Ile Ile  Gly Asn Gln Thr Ile  Asp Phe Ser Gly Asp  Ile Asp Asn
    1385                1390                1395

Lys Asp  Arg Tyr Ile Phe Leu  Thr Cys Glu Leu Asp  Asp Lys Ile
    1400                1405                1410

Ser Leu  Ile Ile Glu Ile Asn  Leu Val Ala Lys Ser  Tyr Ser Leu
    1415                1420                1425

Leu Leu  Ser Gly Asp Lys Asn  Tyr Leu Ile Ser Asn  Leu Ser Asn
    1430                1435                1440

Thr Ile  Glu Lys Ile Asn Thr  Leu Gly Leu Asp Ser  Lys Asn Ile
    1445                1450                1455

Ala Tyr  Asn Tyr Thr Asp Glu  Ser Asn Asn Lys Tyr  Phe Gly Ala
    1460                1465                1470

Ile Ser  Lys Thr Ser Gln Lys  Ser Ile Ile His Tyr  Lys Lys Asp
    1475                1480                1485

Ser Lys  Asn Ile Leu Glu Phe  Tyr Asn Gly Ser Thr  Leu Glu Phe
    1490                1495                1500

Asn Ser  Lys Asp Phe Ile Ala  Glu Asp Ile Asn Val  Phe Met Lys
    1505                1510                1515

Asp Asp  Ile Asn Thr Ile Thr  Gly Lys Tyr Tyr Val  Asp Asn Asn
    1520                1525                1530

Thr Asp  Lys Ser Ile Asp Phe  Ser Ile Ser Leu Val  Ser Lys Asn
    1535                1540                1545

Gln Val  Lys Val Asn Gly Leu  Tyr Leu Asn Glu Ser  Val Tyr Ser
    1550                1555                1560
```

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```
Ser Tyr  Leu Asp Phe Val Lys  Asn Ser Asp Gly His  His Asn Thr
    1565                1570                1575

Ser Asn  Phe Met Asn Leu Phe  Leu Asn Asn Ile Ser  Phe Trp Lys
    1580                1585                1590

Leu Phe  Gly Phe Glu Asn Ile  Asn Phe Val Ile Asp  Lys Tyr Phe
    1595                1600                1605

Thr Leu  Val Gly Lys Thr Asn  Leu Gly Tyr Val Glu  Phe Ile Cys
    1610                1615                1620

Asp Asn  Asn Lys Asn Ile Asp  Ile Tyr Phe Gly Glu  Trp Lys Thr
    1625                1630                1635

Ser Ser  Ser Lys Ser Thr Ile  Phe Ser Gly Asn Gly  Arg Asn Val
    1640                1645                1650

Val Val  Glu Pro Ile Tyr Asn  Pro Asp Thr Gly Glu  Asp Ile Ser
    1655                1660                1665

Thr Ser  Leu Asp Phe Ser Tyr  Glu Pro Leu Tyr Gly  Ile Asp Arg
    1670                1675                1680

Tyr Ile  Asn Lys Val Leu Ile  Ala Pro Asp Leu Tyr  Thr Ser Leu
    1685                1690                1695

Ile Asn  Ile Asn Thr Asn Tyr  Tyr Ser Asn Glu Tyr  Tyr Pro Glu
    1700                1705                1710

Ile Ile  Val Leu Asn Pro Asn  Thr Phe His Lys Lys  Val Asn Ile
    1715                1720                1725

Asn Leu  Asp Ser Ser Ser Phe  Glu Tyr Lys Trp Ser  Thr Glu Gly
    1730                1735                1740

Ser Asp  Phe Ile Leu Val Arg  Tyr Leu Glu Glu Ser  Asn Lys Lys
    1745                1750                1755
```

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```
Ile Leu  Gln Lys Ile Arg Ile  Lys Gly Ile Leu Ser  Asn Thr Gln
    1760                1765                1770

Ser Phe  Asn Lys Met Ser Ile  Asp Phe Lys Asp Ile  Lys Lys Leu
    1775                1780                1785

Ser Leu  Gly Tyr Ile Met Ser  Asn Phe Lys Ser Phe  Asn Ser Glu
    1790                1795                1800

Asn Glu  Leu Asp Arg Asp His  Leu Gly Phe Lys Ile  Ile Asp Asn
    1805                1810                1815

Lys Thr  Tyr Tyr Tyr Asp Glu  Asp Ser Lys Leu Val  Lys Gly Leu
    1820                1825                1830

Ile Asn  Ile Asn Asn Ser Leu  Phe Tyr Phe Asp Pro  Ile Glu Ser
    1835                1840                1845

Asn Leu  Val Thr Gly Trp Gln  Thr Ile Asn Gly Lys  Lys Tyr Tyr
    1850                1855                1860

Phe Asp  Ile Asn Thr Gly Ala  Ala Ser Thr Ser Tyr  Lys Ile Ile
    1865                1870                1875

Asn Gly  Lys His Phe Tyr Phe  Asn Asn Asn Gly Val  Met Gln Leu
    1880                1885                1890

Gly Val  Phe Lys Gly Pro Asp  Gly Phe Glu Tyr Phe  Ala Pro Ala
    1895                1900                1905

Asn Thr  Gln Asn Asn Asn Ile  Glu Gly Gln Ala Ile  Val Tyr Gln
    1910                1915                1920

Ser Lys  Phe Leu Thr Leu Asn  Gly Lys Lys Tyr Tyr  Phe Asp Asn
    1925                1930                1935

Asp Ser  Lys Ala Val Thr Gly  Trp Arg Ile Ile Asn  Asn Glu Lys
    1940                1945                1950
```

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Tyr Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln
1955 1960 1965

Val Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile
1970 1975 1980

Ile Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe
1985 1990 1995

Asp Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp
2000 2005 2010

Gly Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly
2015 2020 2025

Val Phe Ser Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2030 2035 2040

Thr Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
2045 2050 2055

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
2060 2065 2070

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr
2075 2080 2085

Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr
2090 2095 2100

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala
2105 2110 2115

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2120 2125 2130

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
2135 2140 2145

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```
Lys Tyr  Phe Tyr Phe Asn Thr  Asp Gly Ile Met Gln  Ile Gly Val
    2150                2155                2160

Phe Lys  Val Pro Asn Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr
    2165                2170                2175

His Asn  Asn Asn Ile Glu Gly  Gln Ala Ile Leu Tyr  Gln Asn Lys
    2180                2185                2190

Phe Leu  Thr Leu Asn Gly Lys  Lys Tyr Tyr Phe Gly  Ser Asp Ser
    2195                2200                2205

Lys Ala  Ile Thr Gly Trp Gln  Thr Ile Asp Gly Lys  Lys Tyr Tyr
    2210                2215                2220

Phe Asn  Pro Asn Asn Ala Ile  Ala Ala Thr His Leu  Cys Thr Ile
    2225                2230                2235

Asn Asn  Asp Lys Tyr Tyr Phe  Ser Tyr Asp Gly Ile  Leu Gln Asn
    2240                2245                2250

Gly Tyr  Ile Thr Ile Glu Arg  Asn Asn Phe Tyr Phe  Asp Ala Asn
    2255                2260                2265

Asn Glu  Ser Lys Met Val Thr  Gly Val Phe Lys Gly  Pro Asn Gly
    2270                2275                2280

Phe Glu  Tyr Phe Ala Pro Ala  Asn Thr His Asn Asn  Asn Ile Glu
    2285                2290                2295

Gly Gln  Ala Ile Val Tyr Gln  Asn Lys Phe Leu Thr  Leu Asn Gly
    2300                2305                2310

Lys Lys  Tyr Tyr Phe Asp Asn  Asp Ser Lys Ala Val  Thr Gly Trp
    2315                2320                2325

Gln Thr  Ile Asp Ser Lys Lys  Tyr Tyr Phe Asn Leu  Asn Thr Ala
    2330                2335                2340
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Val Ala  Val Thr Gly Trp Gln  Thr Ile Asp Gly Glu  Lys Tyr Tyr
    2345                2350                2355

Phe Asn  Leu Asn Thr Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile
    2360                2365                2370

Asp Gly  Lys Arg Tyr Tyr Phe  Asn Thr Asn Thr Tyr  Ile Ala Ser
    2375                2380                2385

Thr Gly  Tyr Thr Ile Ile Asn  Gly Lys His Phe Tyr  Phe Asn Thr
    2390                2395                2400

Asp Gly  Ile Met Gln Ile Gly  Val Phe Lys Gly Pro  Asp Gly Phe
    2405                2410                2415

Glu Tyr  Phe Ala Pro Ala Asn  Thr His Asn Asn Asn  Ile Glu Gly
    2420                2425                2430

Gln Ala  Ile Leu Tyr Gln Asn  Lys Phe Leu Thr Leu  Asn Gly Lys
    2435                2440                2445

Lys Tyr  Tyr Phe Gly Ser Asp  Ser Lys Ala Val Thr  Gly Leu Arg
    2450                2455                2460

Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn Thr Asn  Thr Ala Val
    2465                2470                2475

Ala Val  Thr Gly Trp Gln Thr  Ile Asn Gly Lys Lys  Tyr Tyr Phe
    2480                2485                2490

Asn Thr  Asn Thr Tyr Ile Ala  Ser Thr Gly Tyr Thr  Ile Ile Ser
    2495                2500                2505

Gly Lys  His Phe Tyr Phe Asn  Thr Asp Gly Ile Met  Gln Ile Gly
    2510                2515                2520

Val Phe  Lys Gly Pro Asp Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2525                2530                2535
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Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2540 2545 2550

Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asp
2555 2560 2565

Ser Lys Ala Ala Thr Gly Trp Ala Thr Ile Asp Gly Asn Arg Tyr
2570 2575 2580

Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr
2585 2590 2595

Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile
2600 2605 2610

Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala
2615 2620 2625

Asn Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg Tyr Gln
2630 2635 2640

Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Ser Lys Val
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly
2705 2710

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<211> 2710
<212> PRT
<213> Clostridium difficile

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<400> 88

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Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
            20                  25                  30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
        35                  40                  45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr
    50                  55                  60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65                  70                  75                  80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
            100                 105                 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
        115                 120                 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
    130                 135                 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
```

195 200 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg
210 215 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225 230 235 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
245 250 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
260 265 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
275 280 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
290 295 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
325 330 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
340 345 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
355 360 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
370 375 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385 390 395 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala

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405 410 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
420 425 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
435 440 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
450 455 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465 470 475 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
485 490 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
500 505 510

Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
515 520 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
530 535 540

Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545 550 555 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
565 570 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
580 585 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
595 600 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser

610 615 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625 630 635 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
645 650 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
660 665 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
675 680 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
690 695 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705 710 715 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser
725 730 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
740 745 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
755 760 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
770 775 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785 790 795 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
805 810 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser

```
            820                 825                 830

Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
        835                 840                 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
    850                 855                 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865                 870                 875                 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
                885                 890                 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
            900                 905                 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
        915                 920                 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
    930                 935                 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945                 950                 955                 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
                965                 970                 975

Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
            980                 985                 990

Ala Gln Leu Phe Ser Thr Gly Leu  Asn Thr Ile Tyr Asp  Ser Ile Gln
        995                 1000                1005

Leu Val  Asn Leu Ile Ser Asn  Ala Val Asn Asp Thr  Ile Asn Val
    1010                1015                1020

Leu Pro  Thr Ile Thr Glu Gly  Ile Pro Ile Val Ser  Thr Ile Leu
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1025 1030 1035

Asp Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu
1040 1045 1050

His Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val
1055 1060 1065

Leu Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser
1070 1075 1080

Ile Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile
1085 1090 1095

Ala Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu
1100 1105 1110

Ile Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His
1115 1120 1125

Leu Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp
1130 1135 1140

Lys Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp
1145 1150 1155

Phe Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala
1160 1165 1170

Met Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His
1175 1180 1185

Phe Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser
1190 1195 1200

Ile Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser
1205 1210 1215

Lys Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp

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1220 1225 1230

Trp Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp
1235 1240 1245

Gly Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys
1250 1255 1260

Phe Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr
1265 1270 1275

Leu Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp
1280 1285 1290

Lys Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu
1295 1300 1305

Ile Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr
1310 1315 1320

Tyr Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn
1325 1330 1335

Leu Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val
1340 1345 1350

Arg Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu
1355 1360 1365

Ile Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu
1370 1375 1380

Ile Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn
1385 1390 1395

Lys Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile
1400 1405 1410

Ser Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu

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1415 1420 1425

Leu Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn
1430 1435 1440

Thr Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile
1445 1450 1455

Ala Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala
1460 1465 1470

Ile Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp
1475 1480 1485

Ser Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe
1490 1495 1500

Asn Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys
1505 1510 1515

Asp Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn
1520 1525 1530

Thr Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn
1535 1540 1545

Gln Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser
1550 1555 1560

Ser Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr
1565 1570 1575

Ser Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys
1580 1585 1590

Leu Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe
1595 1600 1605

Thr Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys

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1610 1615 1620

Asp Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr
1625 1630 1635

Ser Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val
1640 1645 1650

Val Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser
1655 1660 1665

Thr Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg
1670 1675 1680

Tyr Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu
1685 1690 1695

Ile Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu
1700 1705 1710

Ile Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile
1715 1720 1725

Asn Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly
1730 1735 1740

Ser Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys
1745 1750 1755

Ile Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln
1760 1765 1770

Ser Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu
1775 1780 1785

Ser Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu
1790 1795 1800

Asn Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn

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1805 1810 1815

Lys Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu
1820 1825 1830

Ile Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe
1835 1840 1845

Asn Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr
1850 1855 1860

Phe Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile
1865 1870 1875

Asn Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu
1880 1885 1890

Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala
1895 1900 1905

Asn Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln
1910 1915 1920

Ser Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn
1925 1930 1935

Asp Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys
1940 1945 1950

Tyr Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln
1955 1960 1965

Val Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile
1970 1975 1980

Ile Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe
1985 1990 1995

Asp Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp

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2000 2005 2010

Gly Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly
2015 2020 2025

Val Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2030 2035 2040

Thr Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
2045 2050 2055

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
2060 2065 2070

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr
2075 2080 2085

Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr
2090 2095 2100

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala
2105 2110 2115

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2120 2125 2130

Thr Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
2135 2140 2145

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2150 2155 2160

Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2165 2170 2175

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu
2180 2185 2190

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser

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2195 2200 2205

Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile
2225 2230 2235

Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn
2240 2245 2250

Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn
2255 2260 2265

Asn Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly
2270 2275 2280

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu
2285 2290 2295

Gly Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly
2300 2305 2310

Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp
2315 2320 2325

Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala
2330 2335 2340

Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr
2345 2350 2355

Phe Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2360 2365 2370

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser
2375 2380 2385

Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr

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2390 2395 2400

Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe
2405 2410 2415

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2420 2425 2430

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2435 2440 2445

Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg
2450 2455 2460

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val
2465 2470 2475

Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
2480 2485 2490

Asn Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser
2495 2500 2505

Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly
2510 2515 2520

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2525 2530 2535

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2540 2545 2550

Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn
2555 2560 2565

Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr
2570 2575 2580

Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr

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2585 2590 2595

Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile
2600 2605 2610

Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala
2615 2620 2625

Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln
2630 2635 2640

Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly
2705 2710

<210> 89
<211> 2710
<212> PRT
<213> Clostridium difficile

<400> 89

Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1 5 10 15

Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
20 25 30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
35 40 45

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```
Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn
    50                  55                  60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65                  70                  75                  80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
            100                 105                 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
        115                 120                 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
    130                 135                 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255
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Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Pro Arg Pro Ser
    290                 295                 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
                325                 330                 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
            340                 345                 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
        355                 360                 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
    370                 375                 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385                 390                 395                 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
                405                 410                 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
            420                 425                 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
        435                 440                 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
    450                 455                 460
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```
Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465                 470                 475                 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
                485                 490                 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
            500                 505                 510

Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
        515                 520                 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
    530                 535                 540

Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545                 550                 555                 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
                565                 570                 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
            580                 585                 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
        595                 600                 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
    610                 615                 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625                 630                 635                 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
                645                 650                 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
            660                 665                 670
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```
Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
        675                 680                 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
    690                 695                 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705                 710                 715                 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser
                725                 730                 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
            740                 745                 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
        755                 760                 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
    770                 775                 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785                 790                 795                 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
                805                 810                 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
            820                 825                 830

Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
        835                 840                 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
    850                 855                 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865                 870                 875                 880
```

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```
Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
                885                 890                 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
            900                 905                 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
        915                 920                 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
    930                 935                 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945                 950                 955                 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
                965                 970                 975

Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
            980                 985                 990

Ala Gln Leu Phe Ser Thr Gly Leu  Asn Thr Ile Tyr Asp  Ser Ile Gln
        995                 1000                1005

Leu Val  Asn Leu Ile Ser Asn  Ala Val Asn Asp Thr  Ile Asn Val
    1010                1015                1020

Leu Pro  Thr Ile Thr Glu Gly  Ile Pro Ile Val Ser  Thr Ile Leu
    1025                1030                1035

Asp Gly  Ile Asn Leu Gly Ala  Ala Ile Lys Glu Leu  Leu Asp Glu
    1040                1045                1050

His Asp  Pro Leu Leu Lys Lys  Glu Leu Glu Ala Lys  Val Gly Val
    1055                1060                1065

Leu Ala  Ile Asn Met Ser Leu  Ser Ile Ala Ala Thr  Val Ala Ser
    1070                1075                1080
```

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```
Ile Val  Gly Ile Gly Ala Glu  Val Thr Ile Phe Leu  Leu Pro Ile
    1085                1090                1095

Ala Gly  Ile Ser Ala Gly Ile  Pro Ser Leu Val Asn  Asn Glu Leu
    1100                1105                1110

Ile Leu  His Asp Lys Ala Thr  Ser Val Val Asn Tyr  Phe Asn His
    1115                1120                1125

Leu Ser  Glu Ser Lys Glu Tyr  Gly Pro Leu Lys Thr  Glu Asp Asp
    1130                1135                1140

Lys Ile  Leu Val Pro Ile Asp  Asp Leu Val Ile Ser  Glu Ile Asp
    1145                1150                1155

Phe Asn  Asn Asn Ser Ile Lys  Leu Gly Thr Cys Asn  Ile Leu Ala
    1160                1165                1170

Met Glu  Gly Gly Ser Gly His  Thr Val Thr Gly Asn  Ile Asp His
    1175                1180                1185

Phe Phe  Ser Ser Pro Tyr Ile  Ser Ser His Ile Pro  Ser Leu Ser
    1190                1195                1200

Val Tyr  Ser Ala Ile Gly Ile  Lys Thr Glu Asn Leu  Asp Phe Ser
    1205                1210                1215

Lys Lys  Ile Met Met Leu Pro  Asn Ala Pro Ser Arg  Val Phe Trp
    1220                1225                1230

Trp Glu  Thr Gly Ala Val Pro  Gly Leu Arg Ser Leu  Glu Asn Asn
    1235                1240                1245

Gly Thr  Lys Leu Leu Asp Ser  Ile Arg Asp Leu Tyr  Pro Gly Lys
    1250                1255                1260

Phe Tyr  Trp Arg Phe Tyr Ala  Phe Phe Asp Tyr Ala  Ile Thr Thr
    1265                1270                1275
```

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```
Leu Lys  Pro Val Tyr Glu Asp  Thr Asn Thr Lys Ile  Lys Leu Asp
    1280                1285                1290

Lys Asp  Thr Arg Asn Phe Ile  Met Pro Thr Ile Thr  Thr Asp Glu
    1295                1300                1305

Ile Arg  Asn Lys Leu Ser Tyr  Ser Phe Asp Gly Ala  Gly Gly Thr
    1310                1315                1320

Tyr Ser  Leu Leu Leu Ser Ser  Tyr Pro Ile Ser Met  Asn Ile Asn
    1325                1330                1335

Leu Ser  Lys Asp Asp Leu Trp  Ile Phe Asn Ile Asp  Asn Glu Val
    1340                1345                1350

Arg Glu  Ile Ser Ile Glu Asn  Gly Thr Ile Lys Lys  Gly Asn Leu
    1355                1360                1365

Ile Glu  Asp Val Leu Ser Lys  Ile Asp Ile Asn Lys  Asn Lys Leu
    1370                1375                1380

Ile Ile  Gly Asn Gln Thr Ile  Asp Phe Ser Gly Asp  Ile Asp Asn
    1385                1390                1395

Lys Asp  Arg Tyr Ile Phe Leu  Thr Cys Glu Leu Asp  Asp Lys Ile
    1400                1405                1410

Ser Leu  Ile Ile Glu Ile Asn  Leu Val Ala Lys Ser  Tyr Ser Leu
    1415                1420                1425

Leu Leu  Ser Gly Asp Lys Asn  Tyr Leu Ile Ser Asn  Leu Ser Asn
    1430                1435                1440

Thr Ile  Glu Lys Ile Asn Thr  Leu Gly Leu Asp Ser  Lys Asn Ile
    1445                1450                1455

Ala Tyr  Asn Tyr Thr Asp Glu  Ser Asn Asn Lys Tyr  Phe Gly Ala
    1460                1465                1470
```

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```
Ile Ser  Lys Thr Ser Gln Lys  Ser Ile Ile His Tyr  Lys Lys Asp
    1475                1480                1485

Ser Lys  Asn Ile Leu Glu Phe  Tyr Asn Gly Ser Thr  Leu Glu Phe
    1490                1495                1500

Asn Ser  Lys Asp Phe Ile Ala  Glu Asp Ile Asn Val  Phe Met Lys
    1505                1510                1515

Asp Asp  Ile Asn Thr Ile Thr  Gly Lys Tyr Tyr Val  Asp Asn Asn
    1520                1525                1530

Thr Asp  Lys Ser Ile Asp Phe  Ser Ile Ser Leu Val  Ser Lys Asn
    1535                1540                1545

Gln Val  Lys Val Asn Gly Leu  Tyr Leu Asn Glu Ser  Val Tyr Ser
    1550                1555                1560

Ser Tyr  Leu Asp Phe Val Lys  Asn Ser Asp Gly His  His Asn Thr
    1565                1570                1575

Ser Asn  Phe Met Asn Leu Phe  Leu Asn Asn Ile Ser  Phe Trp Lys
    1580                1585                1590

Leu Phe  Gly Phe Glu Asn Ile  Asn Phe Val Ile Asp  Lys Tyr Phe
    1595                1600                1605

Thr Leu  Val Gly Lys Thr Asn  Leu Gly Tyr Val Glu  Phe Ile Cys
    1610                1615                1620

Asp Asn  Asn Lys Asn Ile Asp  Ile Tyr Phe Gly Glu  Trp Lys Thr
    1625                1630                1635

Ser Ser  Ser Lys Ser Thr Ile  Phe Ser Gly Asn Gly  Arg Asn Val
    1640                1645                1650

Val Val  Glu Pro Ile Tyr Asn  Pro Asp Thr Gly Glu  Asp Ile Ser
    1655                1660                1665
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Thr Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg
1670 1675 1680

Tyr Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu
1685 1690 1695

Ile Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu
1700 1705 1710

Ile Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile
1715 1720 1725

Asn Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly
1730 1735 1740

Ser Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys
1745 1750 1755

Ile Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln
1760 1765 1770

Ser Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu
1775 1780 1785

Ser Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu
1790 1795 1800

Asn Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn
1805 1810 1815

Lys Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu
1820 1825 1830

Ile Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Ser
1835 1840 1845

Asn Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr
1850 1855 1860

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```
Phe Asp  Ile Asn Thr Gly Ala  Ala Ser Thr Ser Tyr  Lys Ile Ile
    1865                1870                1875

Asn Gly  Lys His Phe Tyr Phe  Asn Asn Asn Gly Val  Met Gln Leu
    1880                1885                1890

Gly Val  Phe Lys Gly Pro Asp  Gly Phe Glu Tyr Phe  Ala Pro Ala
    1895                1900                1905

Asn Thr  Gln Asn Asn Asn Ile  Glu Gly Gln Ala Ile  Val Tyr Gln
    1910                1915                1920

Ser Lys  Phe Leu Thr Leu Asn  Gly Lys Lys Tyr Tyr  Phe Asp Asn
    1925                1930                1935

Asp Ser  Lys Ala Val Thr Gly  Trp Arg Ile Ile Asn  Asn Glu Lys
    1940                1945                1950

Tyr Tyr  Phe Asn Pro Asn Asn  Ala Ile Ala Ala Val  Gly Leu Gln
    1955                1960                1965

Val Ile  Asp Asn Asn Lys Tyr  Tyr Phe Asn Pro Asp  Thr Ala Ile
    1970                1975                1980

Ile Ser  Lys Gly Trp Gln Thr  Val Asn Gly Ser Arg  Tyr Tyr Phe
    1985                1990                1995

Asp Thr  Asp Thr Ala Ile Ala  Phe Asn Gly Tyr Lys  Thr Ile Asp
    2000                2005                2010

Gly Lys  His Phe Tyr Phe Asp  Ser Asp Cys Val Val  Lys Ile Gly
    2015                2020                2025

Val Phe  Ser Gly Ser Asn Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2030                2035                2040

Thr Tyr  Asn Asn Asn Ile Glu  Gly Gln Ala Ile Val  Tyr Gln Ser
    2045                2050                2055
```

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Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
2060 2065 2070

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr
2075 2080 2085

Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr
2090 2095 2100

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala
2105 2110 2115

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2120 2125 2130

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
2135 2140 2145

Lys Tyr Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2150 2155 2160

Phe Lys Val Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2165 2170 2175

His Asn Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Lys
2180 2185 2190

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser
2195 2200 2205

Lys Ala Ile Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Asn Asn Ala Ile Ala Ala Thr His Leu Cys Thr Ile
2225 2230 2235

Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn
2240 2245 2250

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```
Gly Tyr  Ile Thr Ile Glu Arg  Asn Asn Phe Tyr Phe  Asp Ala Asn
    2255                 2260                 2265

Asn Glu  Ser Lys Met Val Thr  Gly Val Phe Lys Gly  Pro Asn Gly
    2270                 2275                 2280

Phe Glu  Tyr Phe Ala Pro Ala  Asn Thr His Asn Asn  Asn Ile Glu
    2285                 2290                 2295

Gly Gln  Ala Ile Val Tyr Gln  Asn Lys Phe Leu Thr  Leu Asn Gly
    2300                 2305                 2310

Lys Lys  Tyr Tyr Phe Asp Asn  Asp Ser Lys Ala Val  Thr Gly Trp
    2315                 2320                 2325

Gln Thr  Ile Asp Ser Lys Lys  Tyr Tyr Phe Asn Leu  Asn Thr Ala
    2330                 2335                 2340

Val Ala  Val Thr Gly Trp Gln  Thr Ile Asp Gly Glu  Lys Tyr Tyr
    2345                 2350                 2355

Phe Asn  Leu Asn Thr Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile
    2360                 2365                 2370

Asp Gly  Lys Arg Tyr Tyr Phe  Asn Thr Asn Thr Tyr  Ile Ala Ser
    2375                 2380                 2385

Thr Gly  Tyr Thr Ile Ile Asn  Gly Lys His Phe Tyr  Phe Asn Thr
    2390                 2395                 2400

Asp Gly  Ile Met Gln Ile Gly  Val Phe Lys Gly Pro  Asp Gly Phe
    2405                 2410                 2415

Glu Tyr  Phe Ala Pro Ala Asn  Thr His Asn Asn Asn  Ile Glu Gly
    2420                 2425                 2430

Gln Ala  Ile Leu Tyr Gln Asn  Lys Phe Leu Thr Leu  Asn Gly Lys
    2435                 2440                 2445
```

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```
Lys Tyr  Tyr Phe Gly Ser Asp  Ser Lys Ala Val Thr  Gly Leu Arg
    2450                 2455                 2460

Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn Thr Asn  Thr Ala Val
    2465                 2470                 2475

Ala Val  Thr Gly Trp Gln Thr  Ile Asn Gly Lys Lys  Tyr Tyr Phe
    2480                 2485                 2490

Asn Thr  Asn Thr Tyr Ile Ala  Ser Thr Gly Tyr Thr  Ile Ile Ser
    2495                 2500                 2505

Gly Lys  His Phe Tyr Phe Asn  Thr Asp Gly Ile Met  Gln Ile Gly
    2510                 2515                 2520

Val Phe  Lys Gly Pro Asp Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2525                 2530                 2535

Thr Asp  Ala Asn Asn Ile Glu  Gly Gln Ala Ile Arg  Tyr Gln Asn
    2540                 2545                 2550

Arg Phe  Leu Tyr Leu His Asp  Asn Ile Tyr Tyr Phe  Gly Asn Asp
    2555                 2560                 2565

Ser Lys  Ala Ala Thr Gly Trp  Ala Thr Ile Asp Gly  Asn Arg Tyr
    2570                 2575                 2580

Tyr Phe  Glu Pro Asn Thr Ala  Met Gly Ala Asn Gly  Tyr Lys Thr
    2585                 2590                 2595

Ile Asp  Asn Lys Asn Phe Tyr  Phe Arg Asn Gly Leu  Pro Gln Ile
    2600                 2605                 2610

Gly Val  Phe Lys Gly Pro Asn  Gly Phe Glu Tyr Phe  Ala Pro Ala
    2615                 2620                 2625

Asn Thr  Asp Ala Asn Asn Ile  Asp Gly Gln Ala Ile  Arg Tyr Gln
    2630                 2635                 2640
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Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Ser Lys Val
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly
2705 2710

<210> 90
<211> 2710
<212> PRT
<213> Clostridium difficile

<400> 90

Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1 5 10 15

Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
20 25 30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
35 40 45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr
50 55 60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65 70 75 80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
85 90 95

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```
Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
            100                 105                 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
        115                 120                 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
    130                 135                 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
    290                 295                 300
```

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```
Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
                325                 330                 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
            340                 345                 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
        355                 360                 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
    370                 375                 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385                 390                 395                 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
                405                 410                 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
            420                 425                 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
        435                 440                 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
    450                 455                 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465                 470                 475                 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
                485                 490                 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
            500                 505                 510
```

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```
Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
        515                 520                 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
    530                 535                 540

Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545                 550                 555                 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
                565                 570                 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
            580                 585                 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
        595                 600                 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
    610                 615                 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625                 630                 635                 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
                645                 650                 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
            660                 665                 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
        675                 680                 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
    690                 695                 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705                 710                 715                 720
```

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```
Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser
                725                 730                 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
            740                 745                 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
        755                 760                 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
    770                 775                 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785                 790                 795                 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
                805                 810                 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
            820                 825                 830

Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
        835                 840                 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
    850                 855                 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865                 870                 875                 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
                885                 890                 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
            900                 905                 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
        915                 920                 925
```

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```
Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
    930                 935                 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945                 950                 955                 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
                965                 970                 975

Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
            980                 985                 990

Ala Gln Leu Phe Ser Thr Gly Leu  Asn Thr Ile Tyr Asp  Ser Ile Gln
        995                 1000                1005

Leu Val  Asn Leu Ile Ser Asn  Ala Val Asn Asp Thr  Ile Asn Val
    1010                1015                1020

Leu Pro  Thr Ile Thr Glu Gly  Ile Pro Ile Val Ser  Thr Ile Leu
    1025                1030                1035

Asp Gly  Ile Asn Leu Gly Ala  Ala Ile Lys Glu Leu  Leu Asp Glu
    1040                1045                1050

His Asp  Pro Leu Leu Lys Lys  Glu Leu Glu Ala Lys  Val Gly Val
    1055                1060                1065

Leu Ala  Ile Asn Met Ser Leu  Ser Ile Ala Ala Thr  Val Ala Ser
    1070                1075                1080

Ile Val  Gly Ile Gly Ala Glu  Val Thr Ile Phe Leu  Leu Pro Ile
    1085                1090                1095

Ala Gly  Ile Ser Ala Gly Ile  Pro Ser Leu Val Asn  Asn Glu Leu
    1100                1105                1110

Ile Leu  His Asp Lys Ala Thr  Ser Val Val Asn Tyr  Phe Asn His
    1115                1120                1125
```

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```
Leu Ser  Glu Ser Lys Lys Tyr  Gly Pro Leu Lys Thr  Glu Asp Asp
    1130                1135                1140

Lys Ile  Leu Val Pro Ile Asp  Asp Leu Val Ile Ser  Glu Ile Asp
    1145                1150                1155

Phe Asn  Asn Asn Ser Ile Lys  Leu Gly Thr Cys Asn  Ile Leu Ala
    1160                1165                1170

Met Glu  Gly Gly Ser Gly His  Thr Val Thr Gly Asn  Ile Asp His
    1175                1180                1185

Phe Phe  Ser Ser Pro Ser Ile  Ser Ser His Ile Pro  Ser Leu Ser
    1190                1195                1200

Ile Tyr  Ser Ala Ile Gly Ile  Glu Thr Glu Asn Leu  Asp Phe Ser
    1205                1210                1215

Lys Lys  Ile Met Met Leu Pro  Asn Ala Pro Ser Arg  Val Phe Trp
    1220                1225                1230

Trp Glu  Thr Gly Ala Val Pro  Gly Leu Arg Ser Leu  Glu Asn Asp
    1235                1240                1245

Gly Thr  Arg Leu Leu Asp Ser  Ile Arg Asp Leu Tyr  Pro Gly Lys
    1250                1255                1260

Phe Tyr  Trp Arg Phe Tyr Ala  Phe Phe Asp Tyr Ala  Ile Thr Thr
    1265                1270                1275

Leu Lys  Pro Val Tyr Glu Asp  Thr Asn Ile Lys Ile  Lys Leu Asp
    1280                1285                1290

Lys Asp  Thr Arg Asn Phe Ile  Met Pro Thr Ile Thr  Thr Asn Glu
    1295                1300                1305

Ile Arg  Asn Lys Leu Ser Tyr  Ser Phe Asp Gly Ala  Gly Gly Thr
    1310                1315                1320
```

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```
Tyr Ser  Leu Leu Leu Ser Ser  Tyr Pro Ile Ser Thr  Asn Ile Asn
    1325                1330                1335

Leu Ser  Lys Asp Asp Leu Trp  Ile Phe Asn Ile Asp  Asn Glu Val
    1340                1345                1350

Arg Glu  Ile Ser Ile Glu Asn  Gly Thr Ile Lys Lys  Gly Lys Leu
    1355                1360                1365

Ile Lys  Asp Val Leu Ser Lys  Ile Asp Ile Asn Lys  Asn Lys Leu
    1370                1375                1380

Ile Ile  Gly Asn Gln Thr Ile  Asp Phe Ser Gly Asp  Ile Asp Asn
    1385                1390                1395

Lys Asp  Arg Tyr Ile Phe Leu  Thr Cys Glu Leu Asp  Asp Lys Ile
    1400                1405                1410

Ser Leu  Ile Ile Glu Ile Asn  Leu Val Ala Lys Ser  Tyr Ser Leu
    1415                1420                1425

Leu Leu  Ser Gly Asp Lys Asn  Tyr Leu Ile Ser Asn  Leu Ser Asn
    1430                1435                1440

Thr Ile  Glu Lys Ile Asn Thr  Leu Gly Leu Asp Ser  Lys Asn Ile
    1445                1450                1455

Ala Tyr  Asn Tyr Thr Asp Glu  Ser Asn Asn Lys Tyr  Phe Gly Ala
    1460                1465                1470

Ile Ser  Lys Thr Ser Gln Lys  Ser Ile Ile His Tyr  Lys Lys Asp
    1475                1480                1485

Ser Lys  Asn Ile Leu Glu Phe  Tyr Asn Asp Ser Thr  Leu Glu Phe
    1490                1495                1500

Asn Ser  Lys Asp Phe Ile Ala  Glu Asp Ile Asn Val  Phe Met Lys
    1505                1510                1515
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```
Asp Asp  Ile Asn Thr Ile Thr  Gly Lys Tyr Tyr Val  Asp Asn Asn
    1520                1525                1530

Thr Asp  Lys Ser Ile Asp Phe  Ser Ile Ser Leu Val  Ser Lys Asn
    1535                1540                1545

Gln Val  Lys Val Asn Gly Leu  Tyr Leu Asn Glu Ser  Val Tyr Ser
    1550                1555                1560

Ser Tyr  Leu Asp Phe Val Lys  Asn Ser Asp Gly His  His Asn Thr
    1565                1570                1575

Ser Asn  Phe Met Asn Leu Phe  Leu Asp Asn Ile Ser  Phe Trp Lys
    1580                1585                1590

Leu Phe  Gly Phe Glu Asn Ile  Asn Phe Val Ile Asp  Lys Tyr Phe
    1595                1600                1605

Thr Leu  Val Gly Lys Thr Asn  Leu Gly Tyr Val Glu  Phe Ile Cys
    1610                1615                1620

Asp Asn  Asn Lys Asn Ile Asp  Ile Tyr Phe Gly Glu  Trp Lys Thr
    1625                1630                1635

Ser Ser  Ser Lys Ser Thr Ile  Phe Ser Gly Asn Gly  Arg Asn Val
    1640                1645                1650

Val Val  Glu Pro Ile Tyr Asn  Pro Asp Thr Gly Glu  Asp Ile Ser
    1655                1660                1665

Thr Ser  Leu Asp Phe Ser Tyr  Glu Pro Leu Tyr Gly  Ile Asp Arg
    1670                1675                1680

Tyr Ile  Asn Lys Val Leu Ile  Ala Pro Asp Leu Tyr  Thr Ser Leu
    1685                1690                1695

Ile Asn  Ile Asn Thr Asn Tyr  Tyr Ser Asn Glu Tyr  Tyr Pro Glu
    1700                1705                1710
```

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```
Ile Ile  Val Leu Asn Pro Asn  Thr Phe His Lys Lys  Val Asn Ile
    1715                1720                1725

Asn Leu  Asp Ser Ser Ser Phe  Glu Tyr Lys Trp Ser  Thr Glu Gly
    1730                1735                1740

Ser Asp  Phe Ile Leu Val Arg  Tyr Leu Glu Glu Ser  Asn Lys Lys
    1745                1750                1755

Ile Leu  Gln Lys Ile Arg Ile  Lys Gly Ile Leu Ser  Asn Thr Gln
    1760                1765                1770

Ser Phe  Asn Lys Met Ser Ile  Asp Phe Lys Asp Ile  Lys Lys Leu
    1775                1780                1785

Ser Leu  Gly Tyr Ile Met Ser  Asn Phe Lys Ser Phe  Asn Ser Glu
    1790                1795                1800

Asn Glu  Leu Asp Arg Asp His  Leu Gly Phe Lys Ile  Ile Asp Asn
    1805                1810                1815

Lys Thr  Tyr Tyr Tyr Asp Glu  Asp Ser Lys Leu Val  Lys Gly Leu
    1820                1825                1830

Ile Asn  Ile Asn Asn Ser Leu  Phe Tyr Phe Asp Pro  Ile Glu Phe
    1835                1840                1845

Asn Leu  Val Thr Gly Trp Gln  Thr Ile Asn Gly Lys  Lys Tyr Tyr
    1850                1855                1860

Phe Asp  Ile Asn Thr Gly Ala  Ala Leu Thr Ser Tyr  Lys Ile Ile
    1865                1870                1875

Asn Gly  Lys His Phe Tyr Phe  Asn Asn Asp Gly Val  Met Gln Leu
    1880                1885                1890

Gly Val  Phe Lys Gly Pro Asp  Gly Phe Glu Tyr Phe  Ala Pro Ala
    1895                1900                1905
```

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Asn Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln
1910 1915 1920

Ser Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn
1925 1930 1935

Asp Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys
1940 1945 1950

Tyr Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln
1955 1960 1965

Val Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile
1970 1975 1980

Ile Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe
1985 1990 1995

Asp Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp
2000 2005 2010

Gly Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly
2015 2020 2025

Val Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2030 2035 2040

Thr Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
2045 2050 2055

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
2060 2065 2070

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr
2075 2080 2085

Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr
2090 2095 2100

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Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala
2105 2110 2115

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2120 2125 2130

Thr Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
2135 2140 2145

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2150 2155 2160

Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2165 2170 2175

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu
2180 2185 2190

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser
2195 2200 2205

Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile
2225 2230 2235

Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn
2240 2245 2250

Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn
2255 2260 2265

Asn Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly
2270 2275 2280

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu
2285 2290 2295

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```
Gly Gln  Ala Ile Val Tyr Gln  Asn Lys Phe Leu Thr  Leu Asn Gly
    2300                2305                2310

Lys Lys  Tyr Tyr Phe Asp Asn  Asp Ser Lys Ala Val  Thr Gly Trp
    2315                2320                2325

Gln Thr  Ile Asp Gly Lys Lys  Tyr Tyr Phe Asn Leu  Asn Thr Ala
    2330                2335                2340

Glu Ala  Ala Thr Gly Trp Gln  Thr Ile Asp Gly Lys  Lys Tyr Tyr
    2345                2350                2355

Phe Asn  Leu Asn Thr Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile
    2360                2365                2370

Asp Gly  Lys Lys Tyr Tyr Phe  Asn Thr Asn Thr Phe  Ile Ala Ser
    2375                2380                2385

Thr Gly  Tyr Thr Ser Ile Asn  Gly Lys His Phe Tyr  Phe Asn Thr
    2390                2395                2400

Asp Gly  Ile Met Gln Ile Gly  Val Phe Lys Gly Pro  Asn Gly Phe
    2405                2410                2415

Glu Tyr  Phe Ala Pro Ala Asn  Thr His Asn Asn Asn  Ile Glu Gly
    2420                2425                2430

Gln Ala  Ile Leu Tyr Gln Asn  Lys Phe Leu Thr Leu  Asn Gly Lys
    2435                2440                2445

Lys Tyr  Tyr Phe Gly Ser Asp  Ser Lys Ala Val Thr  Gly Leu Arg
    2450                2455                2460

Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn Thr Asn  Thr Ala Val
    2465                2470                2475

Ala Val  Thr Gly Trp Gln Thr  Ile Asn Gly Lys Lys  Tyr Tyr Phe
    2480                2485                2490
```

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Asn Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser
2495 2500 2505

Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly
2510 2515 2520

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2525 2530 2535

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2540 2545 2550

Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn
2555 2560 2565

Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr
2570 2575 2580

Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr
2585 2590 2595

Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile
2600 2605 2610

Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala
2615 2620 2625

Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln
2630 2635 2640

Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

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Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly
2705 2710

<210> 91
<211> 2710
<212> PRT
<213> Clostridium difficile

<400> 91

Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1 5 10 15

Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
20 25 30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
35 40 45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr
50 55 60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65 70 75 80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
100 105 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
115 120 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
130 135 140

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```
Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
    290                 295                 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
                325                 330                 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
            340                 345                 350
```

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```
Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
        355                 360                 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
    370                 375                 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385                 390                 395                 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
                405                 410                 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
            420                 425                 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
        435                 440                 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
    450                 455                 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465                 470                 475                 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
                485                 490                 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
            500                 505                 510

Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
        515                 520                 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
    530                 535                 540

Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545                 550                 555                 560
```

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```
Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
                565                 570                 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
            580                 585                 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
        595                 600                 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
    610                 615                 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625                 630                 635                 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
                645                 650                 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
            660                 665                 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
        675                 680                 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
    690                 695                 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705                 710                 715                 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser
                725                 730                 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
            740                 745                 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
        755                 760                 765
```

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```
Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
    770                 775                 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785                 790                 795                 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
                805                 810                 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
            820                 825                 830

Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
        835                 840                 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
    850                 855                 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865                 870                 875                 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
                885                 890                 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
            900                 905                 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
        915                 920                 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
    930                 935                 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945                 950                 955                 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
                965                 970                 975
```

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```
Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
            980                 985                 990

Ala Gln Leu Phe Ser Thr Gly Leu  Asn Thr Ile Tyr Asp  Ser Ile Gln
        995                 1000                1005

Leu Val  Asn Leu Ile Ser Asn  Ala Val Asn Asp Thr  Ile Asn Val
    1010                1015                1020

Leu Pro  Thr Ile Thr Glu Gly  Ile Pro Ile Val Ser  Thr Ile Leu
    1025                1030                1035

Asp Gly  Ile Asn Leu Gly Ala  Ala Ile Lys Glu Leu  Leu Asp Glu
    1040                1045                1050

His Asp  Pro Leu Leu Lys Lys  Glu Leu Glu Ala Lys  Val Gly Val
    1055                1060                1065

Leu Ala  Ile Asn Met Ser Leu  Ser Ile Ala Ala Thr  Val Ala Ser
    1070                1075                1080

Ile Val  Gly Ile Gly Ala Glu  Val Thr Ile Phe Leu  Leu Pro Ile
    1085                1090                1095

Ala Gly  Ile Ser Ala Gly Ile  Pro Ser Leu Val Asn  Asn Glu Leu
    1100                1105                1110

Ile Leu  His Asp Lys Ala Thr  Ser Val Val Asn Tyr  Phe Asn His
    1115                1120                1125

Leu Ser  Glu Ser Lys Lys Tyr  Gly Pro Leu Lys Thr  Glu Asp Asp
    1130                1135                1140

Lys Ile  Leu Val Pro Ile Asp  Asp Leu Val Ile Ser  Glu Ile Asp
    1145                1150                1155

Phe Asn  Asn Asn Ser Ile Lys  Leu Gly Thr Cys Asn  Ile Leu Ala
    1160                1165                1170
```

```
Met Glu  Gly Gly Ser Gly His  Thr Val Thr Gly Asn  Ile Asp His
    1175                1180                1185

Phe Phe  Ser Ser Pro Ser Ile  Ser Ser His Ile Pro  Ser Leu Ser
    1190                1195                1200

Ile Tyr  Ser Ala Ile Gly Ile  Glu Thr Glu Asn Leu  Asp Phe Ser
    1205                1210                1215

Lys Lys  Ile Met Met Leu Pro  Asn Ala Pro Ser Arg  Val Phe Trp
    1220                1225                1230

Trp Glu  Thr Gly Ala Val Pro  Gly Leu Arg Ser Leu  Glu Asn Asp
    1235                1240                1245

Gly Thr  Arg Leu Leu Asp Ser  Ile Arg Asp Leu Tyr  Pro Gly Lys
    1250                1255                1260

Phe Tyr  Trp Arg Phe Tyr Ala  Phe Phe Asp Tyr Ala  Ile Thr Thr
    1265                1270                1275

Leu Lys  Pro Val Tyr Glu Asp  Thr Asn Ile Lys Ile  Lys Leu Asp
    1280                1285                1290

Lys Asp  Thr Arg Asn Phe Ile  Met Pro Thr Ile Thr  Thr Asn Glu
    1295                1300                1305

Ile Arg  Asn Lys Leu Ser Tyr  Ser Phe Asp Gly Ala  Gly Gly Thr
    1310                1315                1320

Tyr Ser  Leu Leu Leu Ser Ser  Tyr Pro Ile Ser Thr  Asn Ile Asn
    1325                1330                1335

Leu Ser  Lys Asp Asp Leu Trp  Ile Phe Asn Ile Asp  Asn Glu Val
    1340                1345                1350

Arg Glu  Ile Ser Ile Glu Asn  Gly Thr Ile Lys Lys  Gly Lys Leu
    1355                1360                1365
```

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```
Ile Lys  Asp Val Leu Ser Lys  Ile Asp Ile Asn Lys  Asn Lys Leu
    1370                1375                1380

Ile Ile  Gly Asn Gln Thr Ile  Asp Phe Ser Gly Asp  Ile Asp Asn
    1385                1390                1395

Lys Asp  Arg Tyr Ile Phe Leu  Thr Cys Glu Leu Asp  Asp Lys Ile
    1400                1405                1410

Ser Leu  Ile Ile Glu Ile Asn  Leu Val Ala Lys Ser  Tyr Ser Leu
    1415                1420                1425

Leu Leu  Ser Gly Asp Lys Asn  Tyr Leu Ile Ser Asn  Leu Ser Asn
    1430                1435                1440

Thr Ile  Glu Lys Ile Asn Thr  Leu Gly Leu Asp Ser  Lys Asn Ile
    1445                1450                1455

Ala Tyr  Asn Tyr Thr Asp Glu  Ser Asn Asn Lys Tyr  Phe Gly Ala
    1460                1465                1470

Ile Ser  Lys Thr Ser Gln Lys  Ser Ile Ile His Tyr  Lys Lys Asp
    1475                1480                1485

Ser Lys  Asn Ile Leu Glu Phe  Tyr Asn Asp Ser Thr  Leu Glu Phe
    1490                1495                1500

Asn Ser  Lys Asp Phe Ile Ala  Glu Asp Ile Asn Val  Phe Met Lys
    1505                1510                1515

Asp Asp  Ile Asn Thr Ile Thr  Gly Lys Tyr Tyr Val  Asp Asn Asn
    1520                1525                1530

Thr Asp  Lys Ser Ile Asp Phe  Ser Ile Ser Leu Val  Ser Lys Asn
    1535                1540                1545

Gln Val  Lys Val Asn Gly Leu  Tyr Leu Asn Glu Ser  Val Tyr Ser
    1550                1555                1560
```

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```
Ser Tyr  Leu Asp Phe Val Lys  Asn Ser Asp Gly His  His Asn Thr
    1565                1570                1575

Ser Asn  Phe Met Asn Leu Phe  Leu Asp Asn Ile Ser  Phe Trp Lys
    1580                1585                1590

Leu Phe  Gly Phe Glu Asn Ile  Asn Phe Val Ile Asp  Lys Tyr Phe
    1595                1600                1605

Thr Leu  Val Gly Lys Thr Asn  Leu Gly Tyr Val Glu  Phe Ile Cys
    1610                1615                1620

Asp Asn  Asn Lys Asn Ile Asp  Ile Tyr Phe Gly Glu  Trp Lys Thr
    1625                1630                1635

Ser Ser  Ser Lys Ser Thr Ile  Phe Ser Gly Asn Gly  Arg Asn Val
    1640                1645                1650

Val Val  Glu Pro Ile Tyr Asn  Pro Asp Thr Gly Glu  Asp Ile Ser
    1655                1660                1665

Thr Ser  Leu Asp Phe Ser Tyr  Glu Pro Leu Tyr Gly  Ile Asp Arg
    1670                1675                1680

Tyr Ile  Asn Lys Val Leu Ile  Ala Pro Asp Leu Tyr  Thr Ser Leu
    1685                1690                1695

Ile Asn  Ile Asn Thr Asn Tyr  Tyr Ser Asn Glu Tyr  Tyr Pro Glu
    1700                1705                1710

Ile Ile  Val Leu Asn Pro Asn  Thr Phe His Lys Lys  Val Asn Ile
    1715                1720                1725

Asn Leu  Asp Ser Ser Ser Phe  Glu Tyr Lys Trp Ser  Thr Glu Gly
    1730                1735                1740

Ser Asp  Phe Ile Leu Val Arg  Tyr Leu Glu Glu Ser  Asn Lys Lys
    1745                1750                1755
```

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```
Ile Leu  Gln Lys Ile Arg Ile  Lys Gly Ile Leu Ser  Asn Thr Gln
    1760                1765                1770

Ser Phe  Asn Lys Met Ser Ile  Asp Phe Lys Asp Ile  Lys Lys Leu
    1775                1780                1785

Ser Leu  Gly Tyr Ile Met Ser  Asn Phe Lys Ser Phe  Asn Ser Glu
    1790                1795                1800

Asn Glu  Leu Asp Arg Asp His  Leu Gly Phe Lys Ile  Ile Asp Asn
    1805                1810                1815

Lys Thr  Tyr Tyr Tyr Asp Glu  Asp Ser Lys Leu Val  Lys Gly Leu
    1820                1825                1830

Ile Asn  Ile Asn Asn Ser Leu  Phe Tyr Phe Asp Pro  Ile Glu Phe
    1835                1840                1845

Asn Leu  Val Thr Gly Trp Gln  Thr Ile Asn Gly Lys  Lys Tyr Tyr
    1850                1855                1860

Phe Asp  Ile Asn Thr Gly Ala  Ala Leu Thr Ser Tyr  Lys Ile Ile
    1865                1870                1875

Asn Gly  Lys His Phe Tyr Phe  Asn Asn Asp Gly Val  Met Gln Leu
    1880                1885                1890

Gly Val  Phe Lys Gly Pro Asp  Gly Phe Glu Tyr Phe  Ala Pro Ala
    1895                1900                1905

Asn Thr  Gln Asn Asn Asn Ile  Glu Gly Gln Ala Ile  Val Tyr Gln
    1910                1915                1920

Ser Lys  Phe Leu Thr Leu Asn  Gly Lys Lys Tyr Tyr  Phe Asp Asn
    1925                1930                1935

Asp Ser  Lys Ala Val Thr Gly  Trp Arg Ile Ile Asn  Asn Glu Lys
    1940                1945                1950
```

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```
Tyr Tyr  Phe Asn Pro Asn Asn  Ala Ile Ala Ala Val  Gly Leu Gln
    1955                1960                1965

Val Ile  Asp Asn Asn Lys Tyr  Tyr Phe Asn Pro Asp  Thr Ala Ile
    1970                1975                1980

Ile Ser  Lys Gly Trp Gln Thr  Val Asn Gly Ser Arg  Tyr Tyr Phe
    1985                1990                1995

Asp Thr  Asp Thr Ala Ile Ala  Phe Asn Gly Tyr Lys  Thr Ile Asp
    2000                2005                2010

Gly Lys  His Phe Tyr Phe Asp  Ser Asp Cys Val Val  Lys Ile Gly
    2015                2020                2025

Val Phe  Ser Thr Ser Asn Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2030                2035                2040

Thr Tyr  Asn Asn Asn Ile Glu  Gly Gln Ala Ile Val  Tyr Gln Ser
    2045                2050                2055

Lys Phe  Leu Thr Leu Asn Gly  Lys Lys Tyr Tyr Phe  Asp Asn Asn
    2060                2065                2070

Ser Lys  Ala Val Thr Gly Trp  Gln Thr Ile Asp Ser  Lys Lys Tyr
    2075                2080                2085

Tyr Phe  Asn Thr Asn Thr Ala  Glu Ala Ala Thr Gly  Trp Gln Thr
    2090                2095                2100

Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr Asn Thr  Ala Glu Ala
    2105                2110                2115

Ala Thr  Gly Trp Gln Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn
    2120                2125                2130

Thr Asn  Thr Ala Ile Ala Ser  Thr Gly Tyr Thr Ile  Ile Asn Gly
    2135                2140                2145
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Lys His  Phe Tyr Phe Asn Thr  Asp Gly Ile Met Gln  Ile Gly Val
    2150                2155                2160

Phe Lys  Gly Pro Asn Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr
    2165                2170                2175

Asp Ala  Asn Asn Ile Glu Gly  Gln Ala Ile Leu Tyr  Gln Asn Glu
    2180                2185                2190

Phe Leu  Thr Leu Asn Gly Lys  Lys Tyr Tyr Phe Gly  Ser Asp Ser
    2195                2200                2205

Lys Ala  Val Thr Gly Trp Arg  Ile Ile Asn Asn Lys  Lys Tyr Tyr
    2210                2215                2220

Phe Asn  Pro Asn Asn Ala Ile  Ala Ala Ile His Leu  Cys Thr Ile
    2225                2230                2235

Asn Asn  Asp Lys Tyr Tyr Phe  Ser Tyr Asp Gly Ile  Leu Gln Asn
    2240                2245                2250

Gly Tyr  Ile Thr Ile Glu Arg  Asn Asn Phe Tyr Phe  Asp Ala Asn
    2255                2260                2265

Asn Glu  Ser Lys Met Val Thr  Gly Val Phe Lys Gly  Pro Asn Gly
    2270                2275                2280

Phe Glu  Tyr Phe Ala Pro Ala  Asn Thr His Asn Asn  Asn Ile Glu
    2285                2290                2295

Gly Gln  Ala Ile Val Tyr Gln  Asn Lys Phe Leu Thr  Leu Asn Gly
    2300                2305                2310

Lys Lys  Tyr Tyr Phe Asp Asn  Asp Ser Lys Ala Val  Thr Gly Trp
    2315                2320                2325

Gln Thr  Ile Asp Gly Lys Lys  Tyr Tyr Phe Asn Leu  Asn Thr Ala
    2330                2335                2340
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Glu Ala  Ala Thr Gly Trp Gln  Thr Ile Asp Gly Lys  Lys Tyr Tyr
    2345                2350                2355

Phe Asn  Leu Asn Thr Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile
    2360                2365                2370

Asp Gly  Lys Lys Tyr Tyr Phe  Asn Thr Asn Thr Phe  Ile Ala Ser
    2375                2380                2385

Thr Gly  Tyr Thr Ser Ile Asn  Gly Lys His Phe Tyr  Phe Asn Thr
    2390                2395                2400

Asp Gly  Ile Met Gln Ile Gly  Val Phe Lys Gly Pro  Asn Gly Phe
    2405                2410                2415

Glu Tyr  Phe Ala Pro Ala Asn  Thr His Asn Asn Asn  Ile Glu Gly
    2420                2425                2430

Gln Ala  Ile Leu Tyr Gln Asn  Lys Phe Leu Thr Leu  Asn Gly Lys
    2435                2440                2445

Lys Tyr  Tyr Phe Gly Ser Asp  Ser Lys Ala Val Thr  Gly Leu Arg
    2450                2455                2460

Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn Thr Asn  Thr Ala Val
    2465                2470                2475

Ala Val  Thr Gly Trp Gln Thr  Ile Asn Gly Lys Lys  Tyr Tyr Phe
    2480                2485                2490

Asn Thr  Asn Thr Ser Ile Ala  Ser Thr Gly Tyr Thr  Ile Ile Ser
    2495                2500                2505

Gly Lys  His Phe Tyr Phe Asn  Thr Asp Gly Ile Met  Gln Ile Gly
    2510                2515                2520

Val Phe  Lys Gly Pro Asp Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2525                2530                2535
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Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2540 2545 2550

Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn
2555 2560 2565

Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr
2570 2575 2580

Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr
2585 2590 2595

Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile
2600 2605 2610

Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala
2615 2620 2625

Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln
2630 2635 2640

Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly
2705 2710

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<211> 2710
<212> PRT
<213> Clostridium difficile

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<400> 92

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Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
            20                  25                  30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
        35                  40                  45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr
    50                  55                  60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65                  70                  75                  80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
            100                 105                 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
        115                 120                 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
    130                 135                 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
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195 200 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg
210 215 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225 230 235 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
245 250 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
260 265 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
275 280 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
290 295 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
325 330 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
340 345 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
355 360 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
370 375 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385 390 395 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala

405 410 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
420 425 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
435 440 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
450 455 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465 470 475 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
485 490 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
500 505 510

Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
515 520 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
530 535 540

Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545 550 555 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
565 570 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
580 585 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
595 600 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser

610 615 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625 630 635 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
645 650 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
660 665 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
675 680 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
690 695 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705 710 715 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser
725 730 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
740 745 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
755 760 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
770 775 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785 790 795 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
805 810 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser

820 825 830

Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
835 840 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
850 855 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865 870 875 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
885 890 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
900 905 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
915 920 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
930 935 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945 950 955 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
965 970 975

Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
980 985 990

Ala Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln
995 1000 1005

Leu Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val
1010 1015 1020

Leu Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu

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1025 1030 1035

Asp Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu
1040 1045 1050

His Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val
1055 1060 1065

Leu Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser
1070 1075 1080

Ile Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile
1085 1090 1095

Ala Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu
1100 1105 1110

Ile Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His
1115 1120 1125

Leu Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp
1130 1135 1140

Lys Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp
1145 1150 1155

Phe Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala
1160 1165 1170

Met Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His
1175 1180 1185

Phe Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser
1190 1195 1200

Ile Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser
1205 1210 1215

Lys Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp

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1220                1225                1230

Trp Glu  Thr Gly Ala Val Pro  Gly Leu Arg Ser Leu  Glu Asn Asp
1235                1240                1245

Gly Thr  Arg Leu Leu Asp Ser  Ile Arg Asp Leu Tyr  Pro Gly Lys
1250                1255                1260

Phe Tyr  Trp Arg Phe Tyr Ala  Phe Phe Asp Tyr Ala  Ile Thr Thr
1265                1270                1275

Leu Lys  Pro Val Tyr Glu Asp  Thr Asn Ile Lys Ile  Lys Leu Asp
1280                1285                1290

Lys Asp  Thr Arg Asn Phe Ile  Met Pro Thr Ile Thr  Thr Asn Glu
1295                1300                1305

Ile Arg  Asn Lys Leu Ser Tyr  Ser Phe Asp Gly Ala  Gly Gly Thr
1310                1315                1320

Tyr Ser  Leu Leu Leu Ser Ser  Tyr Pro Ile Ser Thr  Asn Ile Asn
1325                1330                1335

Leu Ser  Lys Asp Asp Leu Trp  Ile Phe Asn Ile Asp  Asn Glu Val
1340                1345                1350

Arg Glu  Ile Ser Ile Glu Asn  Gly Thr Ile Lys Lys  Gly Lys Leu
1355                1360                1365

Ile Lys  Asp Val Leu Ser Lys  Ile Asp Ile Asn Lys  Asn Lys Leu
1370                1375                1380

Ile Ile  Gly Asn Gln Thr Ile  Asp Phe Ser Gly Asp  Ile Asp Asn
1385                1390                1395

Lys Asp  Arg Tyr Ile Phe Leu  Thr Cys Glu Leu Asp  Asp Lys Ile
1400                1405                1410

Ser Leu  Ile Ile Glu Ile Asn  Leu Val Ala Lys Ser  Tyr Ser Leu
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1415 1420 1425

Leu Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn
1430 1435 1440

Thr Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile
1445 1450 1455

Ala Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala
1460 1465 1470

Ile Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp
1475 1480 1485

Ser Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe
1490 1495 1500

Asn Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys
1505 1510 1515

Asp Asp Val Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn
1520 1525 1530

Thr Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn
1535 1540 1545

Gln Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser
1550 1555 1560

Ser Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr
1565 1570 1575

Ser Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys
1580 1585 1590

Leu Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe
1595 1600 1605

Thr Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys

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1610 1615 1620

Asp Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr
1625 1630 1635

Ser Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val
1640 1645 1650

Val Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser
1655 1660 1665

Thr Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg
1670 1675 1680

Tyr Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu
1685 1690 1695

Ile Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu
1700 1705 1710

Ile Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile
1715 1720 1725

Asn Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly
1730 1735 1740

Ser Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys
1745 1750 1755

Ile Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln
1760 1765 1770

Ser Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu
1775 1780 1785

Ser Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu
1790 1795 1800

Asn Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn

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1805 1810 1815

Lys Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu
1820 1825 1830

Ile Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe
1835 1840 1845

Asn Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr
1850 1855 1860

Phe Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile
1865 1870 1875

Asn Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu
1880 1885 1890

Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala
1895 1900 1905

Asn Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln
1910 1915 1920

Ser Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn
1925 1930 1935

Asn Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys
1940 1945 1950

Tyr Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln
1955 1960 1965

Val Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile
1970 1975 1980

Ile Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe
1985 1990 1995

Asp Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp

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2000 2005 2010

Gly Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly
2015 2020 2025

Val Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2030 2035 2040

Thr Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
2045 2050 2055

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
2060 2065 2070

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr
2075 2080 2085

Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr
2090 2095 2100

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala
2105 2110 2115

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2120 2125 2130

Thr Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
2135 2140 2145

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2150 2155 2160

Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2165 2170 2175

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu
2180 2185 2190

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser

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2195 2200 2205

Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile
2225 2230 2235

Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn
2240 2245 2250

Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn
2255 2260 2265

Asn Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly
2270 2275 2280

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu
2285 2290 2295

Gly Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly
2300 2305 2310

Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp
2315 2320 2325

Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala
2330 2335 2340

Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr
2345 2350 2355

Phe Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2360 2365 2370

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser
2375 2380 2385

Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr

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2390 2395 2400

Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe
2405 2410 2415

Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly
2420 2425 2430

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2435 2440 2445

Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg
2450 2455 2460

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val
2465 2470 2475

Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
2480 2485 2490

Asn Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser
2495 2500 2505

Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly
2510 2515 2520

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2525 2530 2535

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2540 2545 2550

Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn
2555 2560 2565

Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr
2570 2575 2580

Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr

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2585 2590 2595

Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile
2600 2605 2610

Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala
2615 2620 2625

Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln
2630 2635 2640

Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly
2705 2710

<210> 93
<211> 2710
<212> PRT
<213> Clostridium difficile

<400> 93

Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1 5 10 15

Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
20 25 30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
35 40 45

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```
Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn
    50                  55                  60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65                  70                  75                  80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
            100                 105                 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
        115                 120                 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
    130                 135                 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Val Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255
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Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
    290                 295                 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
                325                 330                 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
            340                 345                 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
        355                 360                 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
    370                 375                 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385                 390                 395                 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
                405                 410                 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
            420                 425                 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
        435                 440                 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
    450                 455                 460
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Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465                 470                 475                 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
                485                 490                 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
            500                 505                 510

Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
        515                 520                 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
    530                 535                 540

Asp Asn Glu Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545                 550                 555                 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
                565                 570                 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
            580                 585                 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
        595                 600                 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
    610                 615                 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625                 630                 635                 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
                645                 650                 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
            660                 665                 670
```

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```
Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
        675                 680                 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
    690                 695                 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705                 710                 715                 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser
                725                 730                 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
            740                 745                 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
        755                 760                 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
    770                 775                 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785                 790                 795                 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Thr Ser Val Ser
                805                 810                 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
            820                 825                 830

Ser Val Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
        835                 840                 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
    850                 855                 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865                 870                 875                 880
```

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```
Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
                885                 890                 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
            900                 905                 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
        915                 920                 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
    930                 935                 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945                 950                 955                 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
                965                 970                 975

Lys Asp Leu Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
            980                 985                 990

Ala Gln Leu Phe Ser Thr Gly Leu  Asn Thr Ile Tyr Asp  Ser Ile Gln
        995                 1000                1005

Leu Val  Asn Leu Ile Ser Asn  Ala Val Asn Asp Thr  Ile Asn Val
    1010                1015                1020

Leu Pro  Thr Ile Thr Glu Gly  Ile Pro Ile Val Ser  Thr Ile Leu
    1025                1030                1035

Asp Gly  Ile Asn Leu Gly Ala  Ala Ile Lys Glu Leu  Leu Asp Glu
    1040                1045                1050

His Asp  Pro Leu Leu Lys Lys  Glu Leu Glu Ala Lys  Val Gly Val
    1055                1060                1065

Leu Ala  Ile Asn Met Ser Leu  Ser Ile Ala Ala Thr  Val Ala Ser
    1070                1075                1080
```

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```
Ile Val  Gly Ile Gly Ala Glu  Val Thr Ile Phe Leu  Leu Pro Ile
    1085                1090                1095

Ala Gly  Ile Ser Ala Gly Ile  Pro Ser Leu Val Asn  Asn Glu Leu
    1100                1105                1110

Ile Leu  His Asp Lys Ala Thr  Ser Val Val Asn Tyr  Phe Asn His
    1115                1120                1125

Leu Ser  Glu Ser Lys Glu Tyr  Gly Pro Leu Lys Thr  Glu Asp Asp
    1130                1135                1140

Lys Ile  Leu Val Pro Ile Asp  Asp Leu Val Ile Ser  Glu Ile Asp
    1145                1150                1155

Phe Asn  Asn Asn Ala Ile Lys  Leu Gly Thr Cys Asn  Ile Leu Ala
    1160                1165                1170

Met Glu  Gly Gly Ser Gly His  Thr Val Thr Gly Asn  Ile Asp His
    1175                1180                1185

Phe Phe  Ser Ser Pro Ser Ile  Ser Ser His Ile Pro  Ser Leu Ser
    1190                1195                1200

Ile Tyr  Ser Ala Ile Gly Ile  Lys Thr Glu Asn Leu  Asp Phe Ser
    1205                1210                1215

Lys Lys  Ile Met Met Leu Pro  Asn Ala Pro Ser Arg  Val Phe Trp
    1220                1225                1230

Trp Glu  Thr Gly Ala Val Pro  Gly Leu Arg Ser Leu  Glu Asn Asn
    1235                1240                1245

Gly Thr  Lys Leu Leu Asp Ser  Ile Arg Asp Leu Tyr  Pro Gly Lys
    1250                1255                1260

Phe Tyr  Trp Arg Phe Tyr Ala  Phe Phe Asp Tyr Ala  Ile Thr Thr
    1265                1270                1275
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Leu Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp
1280 1285 1290

Lys Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu
1295 1300 1305

Ile Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr
1310 1315 1320

Tyr Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn
1325 1330 1335

Leu Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val
1340 1345 1350

Arg Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu
1355 1360 1365

Ile Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu
1370 1375 1380

Ile Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn
1385 1390 1395

Lys Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile
1400 1405 1410

Ser Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu
1415 1420 1425

Leu Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn
1430 1435 1440

Thr Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile
1445 1450 1455

Ala Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala
1460 1465 1470

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```
Ile Ser  Lys Thr Ser Gln Lys  Ser Ile Ile His Tyr  Lys Lys Asp
    1475                1480                1485

Ser Lys  Asn Ile Leu Glu Phe  Tyr Asn Gly Ser Thr  Leu Glu Phe
    1490                1495                1500

Asn Ser  Lys Asp Phe Ile Ala  Glu Asp Ile Asn Val  Phe Met Lys
    1505                1510                1515

Asp Asp  Ile Asn Thr Ile Thr  Gly Lys Tyr Tyr Val  Asp Asn Asn
    1520                1525                1530

Thr Asp  Lys Ser Ile Asp Phe  Ser Ile Ser Leu Val  Ser Lys Asn
    1535                1540                1545

Gln Ala  Lys Val Asn Gly Leu  Tyr Leu Asn Glu Ser  Val Tyr Ser
    1550                1555                1560

Ser Tyr  Leu Asp Phe Val Lys  Asn Ala Asp Gly His  His Asn Thr
    1565                1570                1575

Ser Asn  Phe Met Asn Leu Phe  Leu Asp Asn Ile Ser  Phe Trp Lys
    1580                1585                1590

Leu Phe  Gly Phe Glu Asn Ile  Asn Phe Val Val Asp  Lys Tyr Phe
    1595                1600                1605

Thr Leu  Val Gly Lys Thr Asn  Leu Gly Tyr Val Glu  Phe Ile Cys
    1610                1615                1620

Asp Asn  Asn Lys Asn Ile Asp  Ile Tyr Phe Gly Glu  Trp Lys Thr
    1625                1630                1635

Ser Ser  Ser Lys Ser Thr Ile  Phe Ser Gly Asn Gly  Arg Asn Val
    1640                1645                1650

Val Val  Glu Pro Ile Tyr Asn  Pro Asp Thr Gly Glu  Asp Ile Ser
    1655                1660                1665
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Thr Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg
1670 1675 1680

Tyr Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu
1685 1690 1695

Ile Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu
1700 1705 1710

Ile Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile
1715 1720 1725

Asn Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly
1730 1735 1740

Ser Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys
1745 1750 1755

Ile Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln
1760 1765 1770

Ser Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu
1775 1780 1785

Ser Leu Val Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu
1790 1795 1800

Asn Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn
1805 1810 1815

Lys Thr Tyr Tyr Tyr Asp Glu Ala Ser Lys Leu Val Lys Gly Leu
1820 1825 1830

Ile Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Ser
1835 1840 1845

Asn Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr
1850 1855 1860

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```
Phe Asp  Ile Asn Thr Gly Ala  Ala Leu Thr Ser Tyr  Lys Ile Ile
    1865                1870                1875

Asn Gly  Lys His Phe Tyr Phe  Asn Asn Asn Gly Val  Met Gln Leu
    1880                1885                1890

Gly Val  Phe Lys Gly Pro Asp  Arg Phe Glu Tyr Phe  Ala Pro Ala
    1895                1900                1905

Asn Thr  Gln Asn Asn Asn Ile  Glu Gly Gln Ala Ile  Val Tyr Gln
    1910                1915                1920

Ser Lys  Phe Leu Thr Leu Asn  Gly Lys Lys Tyr Tyr  Phe Asp Asn
    1925                1930                1935

Asp Ser  Lys Ala Val Thr Gly  Trp Arg Ile Ile Asn  Asn Glu Lys
    1940                1945                1950

Tyr Tyr  Phe Asn Pro Asn Asn  Ala Ile Ala Ala Val  Gly Leu Gln
    1955                1960                1965

Val Ile  Asp Asn Asn Lys Tyr  Tyr Phe Asn Pro Asp  Thr Ala Ile
    1970                1975                1980

Ile Ser  Lys Gly Trp Gln Thr  Val Asn Gly Ser Arg  Tyr Tyr Phe
    1985                1990                1995

Asp Thr  Asp Thr Ala Ile Ala  Phe Asn Gly Tyr Lys  Thr Ile Asp
    2000                2005                2010

Gly Lys  His Phe Tyr Phe Asp  Ser Asp Cys Val Val  Lys Ile Gly
    2015                2020                2025

Val Phe  Ser Gly Ser Asn Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2030                2035                2040

Thr Tyr  Asn Asn Asn Ile Glu  Gly Gln Ala Ile Val  Tyr Gln Ser
    2045                2050                2055
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Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
2060 2065 2070

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr
2075 2080 2085

Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr
2090 2095 2100

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Val
2105 2110 2115

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2120 2125 2130

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
2135 2140 2145

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2150 2155 2160

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2165 2170 2175

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Lys
2180 2185 2190

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Ala Ser Asp Ser
2195 2200 2205

Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Asn Asn Ala Ile Ala Ala Thr His Leu Tyr Thr Ile
2225 2230 2235

Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn
2240 2245 2250

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```
Gly Tyr  Ile Thr Ile Glu Arg  Asn Asn Phe Tyr Phe  Asp Ala Asn
    2255                 2260                 2265

Asn Glu  Ser Lys Met Val Thr  Gly Val Phe Lys Gly  Pro Asn Gly
    2270                 2275                 2280

Phe Glu  Tyr Phe Ala Pro Ala  Asn Thr His Asn Asn  Asn Ile Glu
    2285                 2290                 2295

Gly Gln  Ala Ile Val Tyr Gln  Asn Lys Phe Leu Thr  Leu Asn Gly
    2300                 2305                 2310

Lys Lys  Tyr Tyr Phe Asp Asn  Asp Ser Lys Ala Val  Thr Gly Trp
    2315                 2320                 2325

Gln Thr  Ile Asp Gly Lys Lys  Tyr Tyr Phe Asn Leu  Asn Thr Ala
    2330                 2335                 2340

Val Ala  Val Thr Gly Trp Gln  Thr Ile Asp Gly Lys  Lys Tyr Tyr
    2345                 2350                 2355

Phe Asn  Thr Asn Thr Ala Glu  Thr Ala Thr Gly Trp  Gln Thr Ile
    2360                 2365                 2370

Asp Gly  Lys Lys Tyr Tyr Phe  Asn Thr Asn Thr Ser  Ile Ala Ser
    2375                 2380                 2385

Thr Gly  Tyr Thr Ile Ile Asn  Gly Lys His Phe Tyr  Phe Asn Thr
    2390                 2395                 2400

Asp Gly  Ile Met Gln Ile Gly  Val Phe Lys Gly Pro  Asp Gly Phe
    2405                 2410                 2415

Glu Tyr  Phe Ala Pro Ala Asn  Thr Asp Ala Asn Asn  Ile Glu Gly
    2420                 2425                 2430

Gln Ala  Ile Leu Tyr Gln Asn  Lys Phe Leu Thr Leu  Asn Gly Lys
    2435                 2440                 2445
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Lys Tyr Tyr Phe Ala Ser Asp Ser Lys Ala Val Thr Gly Leu Arg
2450 2455 2460

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu
2465 2470 2475

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2480 2485 2490

Asn Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn
2495 2500 2505

Asp Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly
2510 2515 2520

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2525 2530 2535

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2540 2545 2550

Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn
2555 2560 2565

Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Arg Arg Tyr
2570 2575 2580

Tyr Phe Glu Pro Asn Thr Ala Ile Gly Ala Asn Gly Tyr Lys Ile
2585 2590 2595

Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile
2600 2605 2610

Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala
2615 2620 2625

Asn Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg Tyr Gln
2630 2635 2640

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Asn Arg Phe Leu His Leu Leu Gly Asn Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Asn Met
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly
2705 2710

<210> 94
<211> 2710
<212> PRT
<213> Clostridium difficile

<400> 94

Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1 5 10 15

Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
20 25 30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
35 40 45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr
50 55 60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65 70 75 80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
85 90 95

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```
Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
            100                 105                 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
        115                 120                 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
    130                 135                 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
    290                 295                 300
```

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```
Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
                325                 330                 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
            340                 345                 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
        355                 360                 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
    370                 375                 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385                 390                 395                 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
                405                 410                 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
            420                 425                 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
        435                 440                 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
    450                 455                 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465                 470                 475                 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
                485                 490                 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
            500                 505                 510
```

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Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
515 520 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
530 535 540

Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545 550 555 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
565 570 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
580 585 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
595 600 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
610 615 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625 630 635 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
645 650 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
660 665 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
675 680 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
690 695 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705 710 715 720

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```
Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser
                725                 730                 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
            740                 745                 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
        755                 760                 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
    770                 775                 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785                 790                 795                 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
                805                 810                 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
            820                 825                 830

Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
        835                 840                 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
    850                 855                 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865                 870                 875                 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
                885                 890                 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
            900                 905                 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
        915                 920                 925
```

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```
Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
    930                 935                 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945                 950                 955                 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
                965                 970                 975

Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
            980                 985                 990

Ala Gln Leu Phe Ser Thr Gly Leu  Asn Thr Ile Tyr Asp  Ser Ile Gln
        995                 1000                1005

Leu Val  Asn Leu Ile Ser Asn  Ala Val Asn Asp Thr  Ile Asn Val
    1010                1015                1020

Leu Pro  Thr Ile Thr Glu Gly  Ile Pro Ile Val Ser  Thr Ile Leu
    1025                1030                1035

Asp Gly  Ile Asn Leu Gly Ala  Ala Ile Lys Glu Leu  Leu Asp Glu
    1040                1045                1050

His Asp  Pro Leu Leu Lys Lys  Glu Leu Glu Ala Lys  Val Gly Val
    1055                1060                1065

Leu Ala  Ile Asn Met Ser Leu  Ser Ile Ala Ala Thr  Val Ala Ser
    1070                1075                1080

Ile Val  Gly Ile Gly Ala Glu  Val Thr Ile Phe Leu  Leu Pro Ile
    1085                1090                1095

Ala Gly  Ile Ser Ala Gly Ile  Pro Ser Leu Val Asn  Asn Glu Leu
    1100                1105                1110

Ile Leu  His Asp Lys Ala Thr  Ser Val Val Asn Tyr  Phe Asn His
    1115                1120                1125
```

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```
Leu Ser  Glu Ser Lys Lys Tyr  Gly Pro Leu Lys Thr  Glu Asp Asp
    1130                1135                1140

Lys Ile  Leu Val Pro Ile Asp  Asp Leu Val Ile Ser  Glu Ile Asp
    1145                1150                1155

Phe Asn  Asn Asn Ser Ile Lys  Leu Gly Thr Cys Asn  Ile Leu Ala
    1160                1165                1170

Met Glu  Gly Gly Ser Gly His  Thr Val Thr Gly Asn  Ile Asp His
    1175                1180                1185

Phe Phe  Ser Ser Pro Ser Ile  Ser Ser His Ile Pro  Ser Leu Ser
    1190                1195                1200

Ile Tyr  Ser Ala Ile Gly Ile  Glu Thr Glu Asn Leu  Asp Phe Ser
    1205                1210                1215

Lys Lys  Ile Met Met Leu Pro  Asn Ala Pro Ser Arg  Val Phe Trp
    1220                1225                1230

Trp Glu  Thr Gly Ala Val Pro  Gly Leu Arg Ser Leu  Glu Asn Asp
    1235                1240                1245

Gly Thr  Arg Leu Leu Asp Ser  Ile Arg Asp Leu Tyr  Pro Gly Lys
    1250                1255                1260

Phe Tyr  Trp Arg Phe Tyr Ala  Phe Phe Asp Tyr Ala  Ile Thr Thr
    1265                1270                1275

Leu Lys  Pro Val Tyr Glu Asp  Thr Asn Ile Lys Ile  Lys Leu Asp
    1280                1285                1290

Lys Asp  Thr Arg Asn Phe Ile  Met Pro Thr Ile Thr  Thr Asn Glu
    1295                1300                1305

Ile Arg  Asn Lys Leu Ser Tyr  Ser Phe Asp Gly Ala  Gly Gly Thr
    1310                1315                1320
```

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```
Tyr Ser  Leu Leu Leu Ser Ser  Tyr Pro Ile Ser Thr  Asn Ile Asn
    1325                1330                1335

Leu Ser  Lys Asp Asp Leu Trp  Ile Phe Asn Ile Asp  Asn Glu Val
    1340                1345                1350

Arg Glu  Ile Ser Ile Glu Asn  Gly Thr Ile Lys Lys  Gly Lys Leu
    1355                1360                1365

Ile Lys  Asp Val Leu Ser Lys  Ile Asp Ile Asn Lys  Asn Lys Leu
    1370                1375                1380

Ile Ile  Gly Asn Gln Thr Ile  Asp Phe Ser Gly Asp  Ile Asp Asn
    1385                1390                1395

Lys Asp  Arg Tyr Ile Phe Leu  Thr Cys Glu Leu Asp  Asp Lys Ile
    1400                1405                1410

Ser Leu  Ile Ile Glu Ile Asn  Leu Val Ala Lys Ser  Tyr Ser Leu
    1415                1420                1425

Leu Leu  Ser Gly Asp Lys Asn  Tyr Leu Ile Ser Asn  Leu Ser Asn
    1430                1435                1440

Thr Ile  Glu Lys Ile Asn Thr  Leu Gly Leu Asp Ser  Lys Asn Ile
    1445                1450                1455

Ala Tyr  Asn Tyr Thr Asp Glu  Ser Asn Asn Lys Tyr  Phe Gly Ala
    1460                1465                1470

Ile Ser  Lys Thr Ser Gln Lys  Ser Ile Ile His Tyr  Lys Lys Asp
    1475                1480                1485

Ser Lys  Asn Ile Leu Glu Phe  Tyr Asn Asp Ser Thr  Leu Glu Phe
    1490                1495                1500

Asn Ser  Lys Asp Phe Ile Ala  Glu Asp Ile Asn Val  Phe Met Lys
    1505                1510                1515
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Asp Asp  Val Asn Thr Ile Thr  Gly Lys Tyr Tyr Val  Asp Asn Asn
    1520                1525                1530

Thr Asp  Lys Ser Ile Asp Phe  Ser Ile Ser Leu Val  Ser Lys Asn
    1535                1540                1545

Gln Val  Lys Val Asn Gly Leu  Tyr Leu Asn Glu Ser  Val Tyr Ser
    1550                1555                1560

Ser Tyr  Leu Asp Phe Val Lys  Asn Ser Asp Gly His  His Asn Thr
    1565                1570                1575

Ser Asn  Phe Met Asn Leu Phe  Leu Asp Asn Ile Ser  Phe Trp Lys
    1580                1585                1590

Leu Phe  Gly Phe Glu Asn Ile  Asn Phe Val Ile Asp  Lys Tyr Phe
    1595                1600                1605

Thr Leu  Val Gly Lys Thr Asn  Leu Gly Tyr Val Glu  Phe Ile Cys
    1610                1615                1620

Asp Asn  Asn Lys Asn Ile Asp  Ile Tyr Phe Gly Glu  Trp Lys Thr
    1625                1630                1635

Ser Ser  Ser Lys Ser Thr Ile  Phe Ser Gly Asn Gly  Arg Asn Val
    1640                1645                1650

Val Val  Glu Pro Ile Tyr Asn  Pro Asp Thr Gly Glu  Asp Ile Ser
    1655                1660                1665

Thr Ser  Leu Asp Phe Ser Tyr  Glu Pro Leu Tyr Gly  Ile Asp Arg
    1670                1675                1680

Tyr Ile  Asn Lys Val Leu Ile  Ala Pro Asp Leu Tyr  Thr Ser Leu
    1685                1690                1695

Ile Asn  Ile Asn Thr Asn Tyr  Tyr Ser Asn Glu Tyr  Tyr Pro Glu
    1700                1705                1710
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Ile Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile
1715 1720 1725

Asn Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly
1730 1735 1740

Ser Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys
1745 1750 1755

Ile Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln
1760 1765 1770

Ser Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu
1775 1780 1785

Ser Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu
1790 1795 1800

Asn Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn
1805 1810 1815

Lys Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu
1820 1825 1830

Ile Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe
1835 1840 1845

Asn Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr
1850 1855 1860

Phe Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile
1865 1870 1875

Asn Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu
1880 1885 1890

Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala
1895 1900 1905

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Asn Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln
1910 1915 1920

Ser Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn
1925 1930 1935

Asn Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys
1940 1945 1950

Tyr Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln
1955 1960 1965

Val Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile
1970 1975 1980

Ile Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe
1985 1990 1995

Asp Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp
2000 2005 2010

Gly Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly
2015 2020 2025

Val Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2030 2035 2040

Thr Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
2045 2050 2055

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
2060 2065 2070

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr
2075 2080 2085

Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr
2090 2095 2100

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Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala
2105 2110 2115

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2120 2125 2130

Thr Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
2135 2140 2145

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2150 2155 2160

Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2165 2170 2175

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu
2180 2185 2190

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser
2195 2200 2205

Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile
2225 2230 2235

Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn
2240 2245 2250

Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn
2255 2260 2265

Asn Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly
2270 2275 2280

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu
2285 2290 2295

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```
Gly Gln  Ala Ile Val Tyr Gln  Asn Lys Phe Leu Thr  Leu Asn Gly
    2300                2305                2310

Lys Lys  Tyr Tyr Phe Asp Asn  Asp Ser Lys Ala Val  Thr Gly Trp
    2315                2320                2325

Gln Thr  Ile Asp Gly Lys Lys  Tyr Tyr Phe Asn Leu  Asn Thr Ala
    2330                2335                2340

Glu Ala  Ala Thr Gly Trp Gln  Thr Ile Asp Gly Lys  Lys Tyr Tyr
    2345                2350                2355

Phe Asn  Leu Asn Thr Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile
    2360                2365                2370

Asp Gly  Lys Lys Tyr Tyr Phe  Asn Thr Asn Thr Phe  Ile Ala Ser
    2375                2380                2385

Thr Gly  Tyr Thr Ser Ile Asn  Gly Lys His Phe Tyr  Phe Asn Thr
    2390                2395                2400

Asp Gly  Ile Met Gln Ile Gly  Val Phe Lys Gly Pro  Asn Gly Phe
    2405                2410                2415

Glu Tyr  Phe Ala Pro Ala Asn  Thr Asp Ala Asn Asn  Ile Glu Gly
    2420                2425                2430

Gln Ala  Ile Leu Tyr Gln Asn  Lys Phe Leu Thr Leu  Asn Gly Lys
    2435                2440                2445

Lys Tyr  Tyr Phe Gly Ser Asp  Ser Lys Ala Val Thr  Gly Leu Arg
    2450                2455                2460

Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn Thr Asn  Thr Ala Val
    2465                2470                2475

Ala Val  Thr Gly Trp Gln Thr  Ile Asn Gly Lys Lys  Tyr Tyr Phe
    2480                2485                2490
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Asn Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser
2495 2500 2505

Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly
2510 2515 2520

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2525 2530 2535

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2540 2545 2550

Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn
2555 2560 2565

Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr
2570 2575 2580

Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr
2585 2590 2595

Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile
2600 2605 2610

Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala
2615 2620 2625

Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln
2630 2635 2640

Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

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```
Phe Glu  Ile Asp Gly Val Ile  Tyr Phe Phe Gly Val  Asp Gly Val
    2690                 2695                 2700


Lys Ala  Pro Gly Ile Tyr Gly
    2705                 2710


<210>  95
<211>  2710
<212>  PRT
<213>  Clostridium difficile

<400>  95

Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1               5                   10                  15


Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
            20                  25                  30


Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
        35                  40                  45


Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn
    50                  55                  60


Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65                  70                  75                  80


Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
                85                  90                  95


Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
            100                 105                 110


Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
        115                 120                 125


Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
    130                 135                 140
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```
Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Val Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
    290                 295                 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
                325                 330                 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
            340                 345                 350
```

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```
Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
        355                 360                 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
    370                 375                 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385                 390                 395                 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
                405                 410                 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
            420                 425                 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
        435                 440                 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
    450                 455                 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465                 470                 475                 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
                485                 490                 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
            500                 505                 510

Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
        515                 520                 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
    530                 535                 540

Asp Asn Glu Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545                 550                 555                 560
```

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```
Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
                565                 570                 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
            580                 585                 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
        595                 600                 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
    610                 615                 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625                 630                 635                 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
                645                 650                 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
            660                 665                 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
        675                 680                 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
    690                 695                 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705                 710                 715                 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser
                725                 730                 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
            740                 745                 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
        755                 760                 765
```

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```
Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
    770                 775                 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785                 790                 795                 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Thr Ser Val Ser
                805                 810                 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
            820                 825                 830

Ser Val Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
        835                 840                 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
    850                 855                 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865                 870                 875                 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
                885                 890                 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
            900                 905                 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
        915                 920                 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
    930                 935                 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945                 950                 955                 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
                965                 970                 975
```

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```
Lys Asp Leu Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
            980                 985                 990

Ala Gln Leu Phe Ser Thr Gly Leu  Asn Thr Ile Tyr Asp  Ser Ile Gln
        995                 1000                1005

Leu Val  Asn Leu Ile Ser Asn  Ala Val Asn Asp Thr  Ile Asn Val
    1010                1015                1020

Leu Pro  Thr Ile Thr Glu Gly  Ile Pro Ile Val Ser  Thr Ile Leu
    1025                1030                1035

Asp Gly  Ile Asn Leu Gly Ala  Ala Ile Lys Glu Leu  Leu Asp Glu
    1040                1045                1050

His Asp  Pro Leu Leu Lys Lys  Glu Leu Glu Ala Lys  Val Gly Val
    1055                1060                1065

Leu Ala  Ile Asn Met Ser Leu  Ser Ile Ala Ala Thr  Val Ala Ser
    1070                1075                1080

Ile Val  Gly Ile Gly Ala Glu  Val Thr Ile Phe Leu  Leu Pro Ile
    1085                1090                1095

Ala Gly  Ile Ser Ala Gly Ile  Pro Ser Leu Val Asn  Asn Glu Leu
    1100                1105                1110

Ile Leu  His Asp Lys Ala Thr  Ser Val Val Asn Tyr  Phe Asn His
    1115                1120                1125

Leu Ser  Glu Ser Lys Glu Tyr  Gly Pro Leu Lys Thr  Glu Asp Asp
    1130                1135                1140

Lys Ile  Leu Val Pro Ile Asp  Asp Leu Val Ile Ser  Glu Ile Asp
    1145                1150                1155

Phe Asn  Asn Asn Ala Ile Lys  Leu Gly Thr Cys Asn  Ile Leu Ala
    1160                1165                1170
```

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```
Met Glu  Gly Gly Ser Gly His  Thr Val Thr Gly Asn  Ile Asp His
    1175                1180                1185

Phe Phe  Ser Ser Pro Ser Ile  Ser Ser His Ile Pro  Ser Leu Ser
    1190                1195                1200

Ile Tyr  Ser Ala Ile Gly Ile  Lys Thr Glu Asn Leu  Asp Phe Ser
    1205                1210                1215

Lys Lys  Ile Met Met Leu Pro  Asn Ala Pro Ser Arg  Val Phe Trp
    1220                1225                1230

Trp Glu  Thr Gly Ala Val Pro  Gly Leu Arg Ser Leu  Glu Asn Asn
    1235                1240                1245

Gly Thr  Lys Leu Leu Asp Ser  Ile Arg Asp Leu Tyr  Pro Gly Lys
    1250                1255                1260

Phe Tyr  Trp Arg Phe Tyr Ala  Phe Phe Asp Tyr Ala  Ile Thr Thr
    1265                1270                1275

Leu Lys  Pro Val Tyr Glu Asp  Thr Asn Ile Lys Ile  Lys Leu Asp
    1280                1285                1290

Lys Asp  Thr Arg Asn Phe Ile  Met Pro Thr Ile Thr  Thr Asn Glu
    1295                1300                1305

Ile Arg  Asn Lys Leu Ser Tyr  Ser Phe Asp Gly Ala  Gly Gly Thr
    1310                1315                1320

Tyr Ser  Leu Leu Leu Ser Ser  Tyr Pro Ile Ser Thr  Asn Ile Asn
    1325                1330                1335

Leu Ser  Lys Asp Asp Leu Trp  Ile Phe Asn Ile Asp  Asn Glu Val
    1340                1345                1350

Arg Glu  Ile Ser Ile Glu Asn  Gly Thr Ile Lys Lys  Gly Lys Leu
    1355                1360                1365
```

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```
Ile Lys  Asp Val Leu Ser Lys  Ile Asp Ile Asn Lys  Asn Lys Leu
    1370                1375                1380

Ile Ile  Gly Asn Gln Thr Ile  Asp Phe Ser Gly Asp  Ile Asp Asn
    1385                1390                1395

Lys Asp  Arg Tyr Ile Phe Leu  Thr Cys Glu Leu Asp  Asp Lys Ile
    1400                1405                1410

Ser Leu  Ile Ile Glu Ile Asn  Leu Val Ala Lys Ser  Tyr Ser Leu
    1415                1420                1425

Leu Leu  Ser Gly Asp Lys Asn  Tyr Leu Ile Ser Asn  Leu Ser Asn
    1430                1435                1440

Thr Ile  Glu Lys Ile Asn Thr  Leu Gly Leu Asp Ser  Lys Asn Ile
    1445                1450                1455

Ala Tyr  Asn Tyr Thr Asp Glu  Ser Asn Asn Lys Tyr  Phe Gly Ala
    1460                1465                1470

Ile Ser  Lys Thr Ser Gln Lys  Ser Ile Ile His Tyr  Lys Lys Asp
    1475                1480                1485

Ser Lys  Asn Ile Leu Glu Phe  Tyr Asn Gly Ser Thr  Leu Glu Phe
    1490                1495                1500

Asn Ser  Lys Asp Phe Ile Ala  Glu Asp Ile Asn Val  Phe Met Lys
    1505                1510                1515

Asp Asp  Ile Asn Thr Ile Thr  Gly Lys Tyr Tyr Val  Asp Asn Asn
    1520                1525                1530

Thr Asp  Lys Ser Ile Asp Phe  Ser Ile Ser Leu Val  Ser Lys Asn
    1535                1540                1545

Gln Ala  Lys Val Asn Gly Leu  Tyr Leu Asn Glu Ser  Val Tyr Ser
    1550                1555                1560
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```
Ser Tyr  Leu Asp Phe Val Lys  Asn Ala Asp Gly His  His Asn Thr
    1565                1570                1575

Ser Asn  Phe Met Asn Leu Phe  Leu Asp Asn Ile Ser  Phe Trp Lys
    1580                1585                1590

Leu Phe  Gly Phe Glu Asn Ile  Asn Phe Val Val Asp  Lys Tyr Phe
    1595                1600                1605

Thr Leu  Val Gly Lys Thr Asn  Leu Gly Tyr Val Glu  Phe Ile Cys
    1610                1615                1620

Asp Asn  Asn Lys Asn Ile Asp  Ile Tyr Phe Gly Glu  Trp Lys Thr
    1625                1630                1635

Ser Ser  Ser Lys Ser Thr Ile  Phe Ser Gly Asn Gly  Arg Asn Val
    1640                1645                1650

Val Val  Glu Pro Ile Tyr Asn  Pro Asp Thr Gly Glu  Asp Ile Ser
    1655                1660                1665

Thr Ser  Leu Asp Phe Ser Tyr  Glu Pro Leu Tyr Gly  Ile Asp Arg
    1670                1675                1680

Tyr Ile  Asn Lys Val Leu Ile  Ala Pro Asp Leu Tyr  Thr Ser Leu
    1685                1690                1695

Ile Asn  Ile Asn Thr Asn Tyr  Tyr Ser Asn Glu Tyr  Tyr Pro Glu
    1700                1705                1710

Ile Ile  Val Leu Asn Pro Asn  Thr Phe His Lys Lys  Val Asn Ile
    1715                1720                1725

Asn Leu  Asp Ser Ser Ser Phe  Glu Tyr Lys Trp Ser  Thr Glu Gly
    1730                1735                1740

Ser Asp  Phe Ile Leu Val Arg  Tyr Leu Glu Glu Ser  Asn Lys Lys
    1745                1750                1755
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Ile Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln
1760 1765 1770

Ser Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu
1775 1780 1785

Ser Leu Val Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu
1790 1795 1800

Asn Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn
1805 1810 1815

Lys Thr Tyr Tyr Tyr Asp Glu Ala Ser Lys Leu Val Lys Gly Leu
1820 1825 1830

Ile Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Ser
1835 1840 1845

Asn Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr
1850 1855 1860

Phe Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile
1865 1870 1875

Asn Gly Lys His Phe Tyr Phe Asn Asn Asn Gly Val Met Gln Leu
1880 1885 1890

Gly Val Phe Lys Gly Pro Asp Arg Phe Glu Tyr Phe Ala Pro Ala
1895 1900 1905

Asn Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln
1910 1915 1920

Ser Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn
1925 1930 1935

Asp Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys
1940 1945 1950

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```
Tyr Tyr  Phe Asn Pro Asn Asn  Ala Ile Ala Ala Val  Gly Leu Gln
    1955                1960                1965

Val Ile  Asp Asn Asn Lys Tyr  Tyr Phe Asn Pro Asp  Thr Ala Ile
    1970                1975                1980

Ile Ser  Lys Gly Trp Gln Thr  Val Asn Gly Ser Arg  Tyr Tyr Phe
    1985                1990                1995

Asp Thr  Asp Thr Ala Ile Ala  Phe Asn Gly Tyr Lys  Thr Ile Asp
    2000                2005                2010

Gly Lys  His Phe Tyr Phe Asp  Ser Asp Cys Val Val  Lys Ile Gly
    2015                2020                2025

Val Phe  Ser Gly Ser Asn Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2030                2035                2040

Thr Tyr  Asn Asn Asn Ile Glu  Gly Gln Ala Ile Val  Tyr Gln Ser
    2045                2050                2055

Lys Phe  Leu Thr Leu Asn Gly  Lys Lys Tyr Tyr Phe  Asp Asn Asn
    2060                2065                2070

Ser Lys  Ala Val Thr Gly Trp  Gln Thr Ile Asp Ser  Lys Lys Tyr
    2075                2080                2085

Tyr Phe  Asn Thr Asn Thr Ala  Glu Ala Ala Thr Gly  Trp Gln Thr
    2090                2095                2100

Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr Asn Thr  Ala Glu Val
    2105                2110                2115

Ala Thr  Gly Trp Gln Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn
    2120                2125                2130

Thr Asn  Thr Ser Ile Ala Ser  Thr Gly Tyr Thr Ile  Ile Asn Gly
    2135                2140                2145
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Lys His  Phe Tyr Phe Asn Thr  Asp Gly Ile Met Gln  Ile Gly Val
    2150                2155                2160

Phe Lys  Gly Pro Asp Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr
    2165                2170                2175

Asp Ala  Asn Asn Ile Glu Gly  Gln Ala Ile Leu Tyr  Gln Asn Lys
    2180                2185                2190

Phe Leu  Thr Leu Asn Gly Lys  Lys Tyr Tyr Phe Ala  Ser Asp Ser
    2195                2200                2205

Lys Ala  Val Thr Gly Trp Arg  Ile Ile Asn Asn Lys  Lys Tyr Tyr
    2210                2215                2220

Phe Asn  Pro Asn Asn Ala Ile  Ala Ala Thr His Leu  Tyr Thr Ile
    2225                2230                2235

Asn Asn  Asp Lys Tyr Tyr Phe  Ser Tyr Asp Gly Ile  Leu Gln Asn
    2240                2245                2250

Gly Tyr  Ile Thr Ile Glu Arg  Asn Asn Phe Tyr Phe  Asp Ala Asn
    2255                2260                2265

Asn Glu  Ser Lys Met Val Thr  Gly Val Phe Lys Gly  Pro Asn Gly
    2270                2275                2280

Phe Glu  Tyr Phe Ala Pro Ala  Asn Thr His Asn Asn  Asn Ile Glu
    2285                2290                2295

Gly Gln  Ala Ile Val Tyr Gln  Asn Lys Phe Leu Thr  Leu Asn Gly
    2300                2305                2310

Lys Lys  Tyr Tyr Phe Asp Asn  Asp Ser Lys Ala Val  Thr Gly Trp
    2315                2320                2325

Gln Thr  Ile Asp Gly Lys Lys  Tyr Tyr Phe Asn Leu  Asn Thr Ala
    2330                2335                2340
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Val Ala  Val Thr Gly Trp Gln  Thr Ile Asp Gly Lys  Lys Tyr Tyr
    2345                2350                2355

Phe Asn  Thr Asn Thr Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile
    2360                2365                2370

Asp Gly  Lys Lys Tyr Tyr Phe  Asn Thr Asn Thr Ser  Ile Ala Ser
    2375                2380                2385

Thr Gly  Tyr Thr Ile Ile Asn  Gly Lys His Phe Tyr  Phe Asn Thr
    2390                2395                2400

Asp Gly  Ile Met Gln Ile Gly  Val Phe Lys Gly Pro  Asp Gly Phe
    2405                2410                2415

Glu Tyr  Phe Ala Pro Ala Asn  Thr Asp Ala Asn Asn  Ile Glu Gly
    2420                2425                2430

Gln Ala  Ile Leu Tyr Gln Asn  Lys Phe Leu Thr Leu  Asn Gly Lys
    2435                2440                2445

Lys Tyr  Tyr Phe Ala Ser Asp  Ser Lys Ala Val Thr  Gly Leu Arg
    2450                2455                2460

Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn Thr Asn  Thr Ala Glu
    2465                2470                2475

Ala Ala  Thr Gly Trp Gln Thr  Ile Asp Gly Lys Lys  Tyr Tyr Phe
    2480                2485                2490

Asn Thr  Asn Thr Ser Ile Ala  Ser Thr Gly Tyr Thr  Ile Ile Asn
    2495                2500                2505

Asp Lys  His Phe Tyr Phe Asn  Thr Asp Gly Ile Met  Gln Ile Gly
    2510                2515                2520

Val Phe  Lys Gly Pro Asp Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2525                2530                2535
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Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2540 2545 2550

Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn
2555 2560 2565

Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Arg Arg Tyr
2570 2575 2580

Tyr Phe Glu Pro Asn Thr Ala Ile Gly Ala Asn Gly Tyr Lys Ile
2585 2590 2595

Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile
2600 2605 2610

Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala
2615 2620 2625

Asn Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg Tyr Gln
2630 2635 2640

Asn Arg Phe Leu His Leu Leu Gly Asn Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Asn Met
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly
2705 2710

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<213> Clostridium difficile

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Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
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Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
            20                  25                  30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
        35                  40                  45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn
    50                  55                  60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65                  70                  75                  80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
            100                 105                 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
        115                 120                 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
    130                 135                 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
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        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Pro Arg Pro Ser
    290                 295                 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
                325                 330                 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
            340                 345                 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
        355                 360                 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
    370                 375                 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385                 390                 395                 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
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405 410 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
420 425 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
435 440 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
450 455 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465 470 475 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
485 490 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
500 505 510

Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
515 520 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
530 535 540

Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545 550 555 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
565 570 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
580 585 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
595 600 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser

610 615 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625 630 635 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
645 650 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
660 665 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
675 680 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
690 695 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705 710 715 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser
725 730 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
740 745 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
755 760 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
770 775 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785 790 795 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
805 810 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser

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            820                 825                 830

Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
        835                 840                 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
    850                 855                 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865                 870                 875                 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
                885                 890                 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
            900                 905                 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
        915                 920                 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
    930                 935                 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945                 950                 955                 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
                965                 970                 975

Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
            980                 985                 990

Ala Gln Leu Phe Ser Thr Gly Leu  Asn Thr Ile Tyr Asp  Ser Ile Gln
        995                 1000                1005

Leu Val  Asn Leu Ile Ser Asn  Ala Val Asn Asp Thr  Ile Asn Val
    1010                1015                1020

Leu Pro  Thr Ile Thr Glu Gly  Ile Pro Ile Val Ser  Thr Ile Leu
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    1025                1030                1035

Asp Gly  Ile Asn Leu Gly Ala  Ala Ile Lys Glu Leu  Leu Asp Glu
    1040                1045                1050

His Asp  Pro Leu Leu Lys Lys  Glu Leu Glu Ala Lys  Val Gly Val
    1055                1060                1065

Leu Ala  Ile Asn Met Ser Leu  Ser Ile Ala Ala Thr  Val Ala Ser
    1070                1075                1080

Ile Val  Gly Ile Gly Ala Glu  Val Thr Ile Phe Leu  Leu Pro Ile
    1085                1090                1095

Ala Gly  Ile Ser Ala Gly Ile  Pro Ser Leu Val Asn  Asn Glu Leu
    1100                1105                1110

Ile Leu  His Asp Lys Ala Thr  Ser Val Val Asn Tyr  Phe Asn His
    1115                1120                1125

Leu Ser  Glu Ser Lys Glu Tyr  Gly Pro Leu Lys Thr  Glu Asp Asp
    1130                1135                1140

Lys Ile  Leu Val Pro Ile Asp  Asp Leu Val Ile Ser  Glu Ile Asp
    1145                1150                1155

Phe Asn  Asn Asn Ser Ile Lys  Leu Gly Thr Cys Asn  Ile Leu Ala
    1160                1165                1170

Met Glu  Gly Gly Ser Gly His  Thr Val Thr Gly Asn  Ile Asp His
    1175                1180                1185

Phe Phe  Ser Ser Pro Tyr Ile  Ser Ser His Ile Pro  Ser Leu Ser
    1190                1195                1200

Val Tyr  Ser Ala Ile Gly Ile  Lys Thr Glu Asn Leu  Asp Phe Ser
    1205                1210                1215

Lys Lys  Ile Met Met Leu Pro  Asn Ala Pro Ser Arg  Val Phe Trp
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1220 1225 1230

Trp Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asn
1235 1240 1245

Gly Thr Lys Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys
1250 1255 1260

Phe Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr
1265 1270 1275

Leu Lys Pro Val Tyr Glu Asp Thr Asn Thr Lys Ile Lys Leu Asp
1280 1285 1290

Lys Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asp Glu
1295 1300 1305

Ile Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr
1310 1315 1320

Tyr Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Met Asn Ile Asn
1325 1330 1335

Leu Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val
1340 1345 1350

Arg Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Asn Leu
1355 1360 1365

Ile Glu Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu
1370 1375 1380

Ile Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn
1385 1390 1395

Lys Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile
1400 1405 1410

Ser Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu

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1415 1420 1425

Leu Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn
1430 1435 1440

Thr Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile
1445 1450 1455

Ala Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala
1460 1465 1470

Ile Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp
1475 1480 1485

Ser Lys Asn Ile Leu Glu Phe Tyr Asn Gly Ser Thr Leu Glu Phe
1490 1495 1500

Asn Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys
1505 1510 1515

Asp Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn
1520 1525 1530

Thr Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn
1535 1540 1545

Gln Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser
1550 1555 1560

Ser Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr
1565 1570 1575

Ser Asn Phe Met Asn Leu Phe Leu Asn Asn Ile Ser Phe Trp Lys
1580 1585 1590

Leu Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe
1595 1600 1605

Thr Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys

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1610 1615 1620

Asp Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr
1625 1630 1635

Ser Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val
1640 1645 1650

Val Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser
1655 1660 1665

Thr Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg
1670 1675 1680

Tyr Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu
1685 1690 1695

Ile Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu
1700 1705 1710

Ile Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile
1715 1720 1725

Asn Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly
1730 1735 1740

Ser Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys
1745 1750 1755

Ile Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln
1760 1765 1770

Ser Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu
1775 1780 1785

Ser Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu
1790 1795 1800

Asn Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn

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1805                1810                1815

Lys Thr  Tyr Tyr Tyr Asp Glu  Asp Ser Lys Leu Val  Lys Gly Leu
    1820                1825                1830

Ile Asn  Ile Asn Asn Ser Leu  Phe Tyr Phe Asp Pro  Ile Glu Ser
    1835                1840                1845

Asn Leu  Val Thr Gly Trp Gln  Thr Ile Asn Gly Lys  Lys Tyr Tyr
    1850                1855                1860

Phe Asp  Ile Asn Thr Gly Ala  Ala Ser Thr Ser Tyr  Lys Ile Ile
    1865                1870                1875

Asn Gly  Lys His Phe Tyr Phe  Asn Asn Asn Gly Val  Met Gln Leu
    1880                1885                1890

Gly Val  Phe Lys Gly Pro Asp  Gly Phe Glu Tyr Phe  Ala Pro Ala
    1895                1900                1905

Asn Thr  Gln Asn Asn Asn Ile  Glu Gly Gln Ala Ile  Val Tyr Gln
    1910                1915                1920

Ser Lys  Phe Leu Thr Leu Asn  Gly Lys Lys Tyr Tyr  Phe Asp Asn
    1925                1930                1935

Asp Ser  Lys Ala Val Thr Gly  Trp Arg Ile Ile Asn  Asn Glu Lys
    1940                1945                1950

Tyr Tyr  Phe Asn Pro Asn Asn  Ala Ile Ala Ala Val  Gly Leu Gln
    1955                1960                1965

Val Ile  Asp Asn Asn Lys Tyr  Tyr Phe Asn Pro Asp  Thr Ala Ile
    1970                1975                1980

Ile Ser  Lys Gly Trp Gln Thr  Val Asn Gly Ser Arg  Tyr Tyr Phe
    1985                1990                1995

Asp Thr  Asp Thr Ala Ile Ala  Phe Asn Gly Tyr Lys  Thr Ile Asp
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2000 2005 2010

Gly Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly
2015 2020 2025

Val Phe Ser Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2030 2035 2040

Thr Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
2045 2050 2055

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
2060 2065 2070

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr
2075 2080 2085

Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr
2090 2095 2100

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala
2105 2110 2115

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2120 2125 2130

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
2135 2140 2145

Lys Tyr Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2150 2155 2160

Phe Lys Val Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2165 2170 2175

His Asn Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Lys
2180 2185 2190

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser

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2195 2200 2205

Lys Ala Ile Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Asn Asn Ala Ile Ala Ala Thr His Leu Cys Thr Ile
2225 2230 2235

Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn
2240 2245 2250

Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn
2255 2260 2265

Asn Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly
2270 2275 2280

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu
2285 2290 2295

Gly Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly
2300 2305 2310

Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp
2315 2320 2325

Gln Thr Ile Asp Ser Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala
2330 2335 2340

Val Ala Val Thr Gly Trp Gln Thr Ile Asp Gly Glu Lys Tyr Tyr
2345 2350 2355

Phe Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2360 2365 2370

Asp Gly Lys Arg Tyr Tyr Phe Asn Thr Asn Thr Tyr Ile Ala Ser
2375 2380 2385

Thr Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr Phe Asn Thr

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2390 2395 2400

Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly Phe
2405 2410 2415

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2420 2425 2430

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2435 2440 2445

Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg
2450 2455 2460

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val
2465 2470 2475

Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
2480 2485 2490

Asn Thr Asn Thr Tyr Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser
2495 2500 2505

Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly
2510 2515 2520

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2525 2530 2535

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2540 2545 2550

Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asp
2555 2560 2565

Ser Lys Ala Ala Thr Gly Trp Ala Thr Ile Asp Gly Asn Arg Tyr
2570 2575 2580

Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr

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2585 2590 2595

Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile
2600 2605 2610

Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala
2615 2620 2625

Asn Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg Tyr Gln
2630 2635 2640

Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Ser Lys Val
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly
2705 2710

<210> 97
<211> 2710
<212> PRT
<213> Clostridium difficile

<400> 97

Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1 5 10 15

Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
20 25 30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
35 40 45

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```
Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr
    50                  55                  60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65                  70                  75                  80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
            100                 105                 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
        115                 120                 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
    130                 135                 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255
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```
Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
    290                 295                 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
                325                 330                 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
            340                 345                 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
        355                 360                 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
    370                 375                 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385                 390                 395                 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
                405                 410                 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
            420                 425                 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
        435                 440                 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
    450                 455                 460
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Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465                 470                 475                 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
                485                 490                 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
            500                 505                 510

Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
        515                 520                 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
    530                 535                 540

Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545                 550                 555                 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
                565                 570                 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
            580                 585                 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
        595                 600                 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
    610                 615                 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625                 630                 635                 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
                645                 650                 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
            660                 665                 670
```

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```
Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
        675                 680                 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
    690                 695                 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705                 710                 715                 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser
                725                 730                 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
            740                 745                 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
        755                 760                 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
    770                 775                 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785                 790                 795                 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
                805                 810                 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
            820                 825                 830

Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
        835                 840                 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
    850                 855                 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865                 870                 875                 880
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Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
                885                 890                 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
            900                 905                 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
        915                 920                 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
    930                 935                 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945                 950                 955                 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
                965                 970                 975

Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
            980                 985                 990

Ala Gln Leu Phe Ser Thr Gly Leu  Asn Thr Ile Tyr Asp  Ser Ile Gln
        995                 1000                1005

Leu Val  Asn Leu Ile Ser Asn  Ala Val Asn Asp Thr  Ile Asn Val
    1010                1015                1020

Leu Pro  Thr Ile Thr Glu Gly  Ile Pro Ile Val Ser  Thr Ile Leu
    1025                1030                1035

Asp Gly  Ile Asn Leu Gly Ala  Ala Ile Lys Glu Leu  Leu Asp Glu
    1040                1045                1050

His Asp  Pro Leu Leu Lys Lys  Glu Leu Glu Ala Lys  Val Gly Val
    1055                1060                1065

Leu Ala  Ile Asn Met Ser Leu  Ser Ile Ala Ala Thr  Val Ala Ser
    1070                1075                1080
```

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```
Ile Val  Gly Ile Gly Ala Glu  Val Thr Ile Phe Leu  Leu Pro Ile
    1085                1090                1095

Ala Gly  Ile Ser Ala Gly Ile  Pro Ser Leu Val Asn  Asn Glu Leu
    1100                1105                1110

Ile Leu  His Asp Lys Ala Thr  Ser Val Val Asn Tyr  Phe Asn His
    1115                1120                1125

Leu Ser  Glu Ser Lys Lys Tyr  Gly Pro Leu Lys Thr  Glu Asp Asp
    1130                1135                1140

Lys Ile  Leu Val Pro Ile Asp  Asp Leu Val Ile Ser  Glu Ile Asp
    1145                1150                1155

Phe Asn  Asn Asn Ser Ile Lys  Leu Gly Thr Cys Asn  Ile Leu Ala
    1160                1165                1170

Met Glu  Gly Gly Ser Gly His  Thr Val Thr Gly Asn  Ile Asp His
    1175                1180                1185

Phe Phe  Ser Ser Pro Ser Ile  Ser Ser His Ile Pro  Ser Leu Ser
    1190                1195                1200

Ile Tyr  Ser Ala Ile Gly Ile  Glu Thr Glu Asn Leu  Asp Phe Ser
    1205                1210                1215

Lys Lys  Ile Met Met Leu Pro  Asn Ala Pro Ser Arg  Val Phe Trp
    1220                1225                1230

Trp Glu  Thr Gly Ala Val Pro  Gly Leu Arg Ser Leu  Glu Asn Asn
    1235                1240                1245

Gly Thr  Lys Leu Leu Asp Ser  Ile Arg Asp Leu Tyr  Pro Gly Lys
    1250                1255                1260

Phe Tyr  Trp Arg Phe Tyr Ala  Phe Phe Asp Tyr Ala  Ile Thr Thr
    1265                1270                1275
```

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```
Leu Lys  Pro Val Tyr Glu Asp  Thr Asn Ile Lys Ile  Lys Leu Asp
    1280                1285                1290

Lys Asp  Thr Arg Asn Phe Ile  Met Pro Thr Ile Thr  Thr Asn Glu
    1295                1300                1305

Ile Arg  Asn Lys Leu Ser Tyr  Ser Phe Asp Gly Ala  Gly Gly Thr
    1310                1315                1320

Tyr Ser  Leu Leu Leu Ser Ser  Tyr Pro Ile Ser Thr  Asn Ile Asn
    1325                1330                1335

Leu Ser  Lys Asp Asp Leu Trp  Ile Phe Asn Ile Asp  Asn Glu Val
    1340                1345                1350

Arg Glu  Ile Ser Ile Glu Asn  Gly Thr Ile Lys Lys  Gly Lys Leu
    1355                1360                1365

Ile Lys  Asp Val Leu Ser Lys  Ile Asp Ile Asn Lys  Asn Lys Leu
    1370                1375                1380

Ile Ile  Gly Asn Gln Thr Ile  Asp Phe Ser Gly Asp  Ile Asp Asn
    1385                1390                1395

Lys Asp  Arg Tyr Ile Phe Leu  Thr Cys Glu Leu Asp  Asp Lys Ile
    1400                1405                1410

Ser Leu  Ile Ile Glu Ile Asn  Leu Val Ala Lys Ser  Tyr Ser Leu
    1415                1420                1425

Leu Leu  Ser Gly Asp Lys Asn  Tyr Leu Ile Ser Asn  Leu Ser Asn
    1430                1435                1440

Thr Ile  Glu Lys Ile Asn Thr  Leu Gly Leu Asp Ser  Lys Asn Ile
    1445                1450                1455

Ala Tyr  Asn Tyr Thr Asp Glu  Ser Asn Asn Lys Tyr  Phe Gly Ala
    1460                1465                1470
```

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```
Ile Ser  Lys Thr Ser Gln Lys  Ser Ile Ile His Tyr  Lys Lys Asp
    1475                1480                1485

Ser Lys  Asn Ile Leu Glu Phe  Tyr Asn Gly Ser Thr  Leu Glu Phe
    1490                1495                1500

Asn Ser  Lys Asp Phe Ile Ala  Glu Asp Ile Asn Val  Phe Met Lys
    1505                1510                1515

Asp Asp  Ile Asn Thr Ile Thr  Gly Lys Tyr Tyr Val  Asp Asn Asn
    1520                1525                1530

Thr Asp  Lys Ser Ile Asp Phe  Ser Ile Ser Leu Val  Ser Lys Asn
    1535                1540                1545

Gln Val  Lys Val Asn Gly Leu  Tyr Leu Asn Glu Ser  Val Tyr Ser
    1550                1555                1560

Ser Tyr  Leu Asp Phe Val Lys  Asn Ser Asp Gly His  His Asn Thr
    1565                1570                1575

Ser Asn  Phe Met Asn Leu Phe  Leu Asp Asn Ile Ser  Phe Trp Lys
    1580                1585                1590

Leu Phe  Gly Phe Glu Asn Ile  Asn Phe Val Ile Asp  Lys Tyr Phe
    1595                1600                1605

Thr Leu  Val Gly Lys Thr Asn  Leu Gly Tyr Val Glu  Phe Ile Cys
    1610                1615                1620

Asp Asn  Asn Lys Asn Ile Asp  Ile Tyr Phe Gly Glu  Trp Lys Thr
    1625                1630                1635

Ser Ser  Ser Lys Ser Thr Ile  Phe Ser Gly Asn Gly  Arg Asn Val
    1640                1645                1650

Val Val  Glu Pro Ile Tyr Asn  Pro Asp Thr Gly Glu  Asp Ile Ser
    1655                1660                1665
```

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```
Thr Ser  Leu Asp Phe Ser Tyr  Glu Pro Leu Tyr Gly  Ile Asp Arg
    1670                1675                1680

Tyr Ile  Asn Lys Val Leu Ile  Ala Pro Asp Leu Tyr  Thr Ser Leu
    1685                1690                1695

Ile Asn  Ile Asn Thr Asn Tyr  Tyr Ser Asn Glu Tyr  Tyr Pro Glu
    1700                1705                1710

Ile Ile  Val Leu Asn Pro Asn  Thr Phe His Lys Lys  Val Asn Ile
    1715                1720                1725

Asn Leu  Asp Ser Ser Ser Phe  Glu Tyr Lys Trp Ser  Thr Glu Gly
    1730                1735                1740

Ser Asp  Phe Ile Leu Val Arg  Tyr Leu Glu Glu Ser  Asn Lys Lys
    1745                1750                1755

Ile Leu  Gln Lys Ile Arg Ile  Lys Gly Ile Leu Ser  Asn Thr Gln
    1760                1765                1770

Ser Phe  Asn Lys Met Ser Ile  Asp Phe Lys Asp Ile  Lys Lys Leu
    1775                1780                1785

Ser Leu  Gly Tyr Ile Met Ser  Asn Phe Lys Ser Phe  Asn Ser Glu
    1790                1795                1800

Asn Glu  Leu Asp Arg Asp His  Leu Gly Phe Lys Ile  Ile Asp Asn
    1805                1810                1815

Lys Thr  Tyr Tyr Tyr Asp Glu  Asp Ser Lys Leu Val  Lys Gly Leu
    1820                1825                1830

Ile Asn  Ile Asn Asn Ser Leu  Phe Tyr Phe Asp Pro  Ile Glu Phe
    1835                1840                1845

Asn Leu  Val Thr Gly Trp Gln  Thr Ile Asn Gly Lys  Lys Tyr Tyr
    1850                1855                1860
```

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```
Phe Asp  Ile Asn Thr Gly Ala  Ala Leu Thr Ser Tyr  Lys Ile Ile
    1865                1870                1875

Asn Gly  Lys His Phe Tyr Phe  Asn Asn Asp Gly Val  Met Gln Leu
    1880                1885                1890

Gly Val  Phe Lys Gly Pro Asp  Gly Phe Glu Tyr Phe  Ala Pro Ala
    1895                1900                1905

Asn Thr  Gln Asn Asn Asn Ile  Glu Gly Gln Ala Ile  Val Tyr Gln
    1910                1915                1920

Ser Lys  Phe Leu Thr Leu Asn  Gly Lys Lys Tyr Tyr  Phe Asp Asn
    1925                1930                1935

Asp Ser  Lys Ala Val Thr Gly  Trp Arg Ile Ile Asn  Asn Glu Lys
    1940                1945                1950

Tyr Tyr  Phe Asn Pro Asn Asn  Ala Ile Ala Ala Val  Gly Leu Gln
    1955                1960                1965

Val Ile  Asp Asn Asn Lys Tyr  Tyr Phe Asn Pro Asp  Thr Ala Ile
    1970                1975                1980

Ile Ser  Lys Gly Trp Gln Thr  Val Asn Gly Ser Arg  Tyr Tyr Phe
    1985                1990                1995

Asp Thr  Asp Thr Ala Ile Ala  Phe Asn Gly Tyr Lys  Thr Ile Asp
    2000                2005                2010

Gly Lys  His Phe Tyr Phe Asp  Ser Asp Cys Val Val  Lys Ile Gly
    2015                2020                2025

Val Phe  Ser Thr Ser Asn Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2030                2035                2040

Thr Tyr  Asn Asn Asn Ile Glu  Gly Gln Ala Ile Val  Tyr Gln Ser
    2045                2050                2055
```

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```
Lys Phe  Leu Thr Leu Asn Gly  Lys Lys Tyr Tyr Phe  Asp Asp Asn
    2060                 2065                 2070

Ser Lys  Ala Val Thr Gly Trp  Gln Thr Ile Asp Ser  Lys Lys Tyr
    2075                 2080                 2085

Tyr Phe  Asn Thr Asn Thr Ala  Glu Ala Ala Thr Gly  Trp Gln Thr
    2090                 2095                 2100

Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr Asn Thr  Ala Glu Ala
    2105                 2110                 2115

Ala Thr  Gly Trp Gln Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn
    2120                 2125                 2130

Thr Asn  Thr Ala Ile Ala Ser  Thr Gly Tyr Thr Ile  Ile Asn Gly
    2135                 2140                 2145

Lys His  Phe Tyr Phe Asn Thr  Asp Gly Ile Met Gln  Ile Gly Val
    2150                 2155                 2160

Phe Lys  Gly Pro Asn Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr
    2165                 2170                 2175

Asp Ala  Asn Asn Ile Glu Gly  Gln Ala Ile Leu Tyr  Gln Asn Glu
    2180                 2185                 2190

Phe Leu  Thr Leu Asn Gly Lys  Lys Tyr Tyr Phe Gly  Ser Asp Ser
    2195                 2200                 2205

Lys Ala  Val Thr Gly Trp Arg  Ile Ile Asn Asn Lys  Lys Tyr Tyr
    2210                 2215                 2220

Phe Asn  Pro Asn Asn Ala Ile  Ala Ala Ile His Leu  Cys Thr Ile
    2225                 2230                 2235

Asn Asn  Asp Lys Tyr Tyr Phe  Ser Tyr Asp Gly Ile  Leu Gln Asn
    2240                 2245                 2250
```

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```
Gly Tyr  Ile Thr Ile Glu Arg  Asn Asn Phe Tyr Phe  Asp Ala Asn
    2255                 2260                 2265

Asn Glu  Ser Lys Met Val Thr  Gly Val Phe Lys Gly  Pro Asn Gly
    2270                 2275                 2280

Phe Glu  Tyr Phe Ala Pro Ala  Asn Thr Tyr Asn Asn  Asn Ile Glu
    2285                 2290                 2295

Gly Gln  Ala Ile Val Tyr Gln  Asn Lys Phe Leu Thr  Leu Asn Gly
    2300                 2305                 2310

Lys Lys  Tyr Tyr Phe Asp Asn  Asp Ser Lys Ala Val  Thr Gly Trp
    2315                 2320                 2325

Gln Thr  Ile Asp Gly Lys Lys  Tyr Tyr Phe Asn Leu  Asn Thr Ala
    2330                 2335                 2340

Glu Ala  Ala Thr Gly Trp Gln  Thr Ile Asp Gly Lys  Lys Tyr Tyr
    2345                 2350                 2355

Phe Asn  Leu Asn Thr Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile
    2360                 2365                 2370

Asp Gly  Lys Lys Tyr Tyr Phe  Asn Thr Asn Thr Phe  Ile Ala Ser
    2375                 2380                 2385

Thr Gly  Tyr Thr Ser Ile Asn  Gly Lys His Phe Tyr  Phe Asn Thr
    2390                 2395                 2400

Asp Gly  Ile Met Gln Ile Gly  Val Phe Lys Gly Pro  Asn Gly Phe
    2405                 2410                 2415

Glu Tyr  Phe Ala Pro Ala Asn  Thr His Asn Asn Asn  Ile Glu Gly
    2420                 2425                 2430

Gln Ala  Ile Leu Tyr Gln Asn  Lys Phe Leu Thr Leu  Asn Gly Lys
    2435                 2440                 2445
```

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```
Lys Tyr  Tyr Phe Gly Ser Asp  Ser Lys Ala Val Thr  Gly Leu Arg
    2450                 2455                 2460

Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn Thr Asn  Thr Ala Val
    2465                 2470                 2475

Ala Val  Thr Gly Trp Gln Thr  Ile Asn Gly Lys Lys  Tyr Tyr Phe
    2480                 2485                 2490

Asn Thr  Asn Thr Ser Ile Ala  Ser Thr Gly Tyr Thr  Ile Ile Ser
    2495                 2500                 2505

Gly Lys  His Phe Tyr Phe Asn  Thr Asp Gly Ile Met  Gln Ile Gly
    2510                 2515                 2520

Val Phe  Lys Gly Pro Asp Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2525                 2530                 2535

Thr Asp  Ala Asn Asn Ile Glu  Gly Gln Ala Ile Arg  Tyr Gln Asn
    2540                 2545                 2550

Arg Phe  Leu Tyr Leu His Asp  Asn Ile Tyr Tyr Phe  Gly Asn Asn
    2555                 2560                 2565

Ser Lys  Ala Ala Thr Gly Trp  Val Thr Ile Asp Gly  Asn Arg Tyr
    2570                 2575                 2580

Tyr Phe  Glu Pro Asn Thr Ala  Met Gly Ala Asn Gly  Tyr Lys Thr
    2585                 2590                 2595

Ile Asp  Asn Lys Asn Phe Tyr  Phe Arg Asn Gly Leu  Pro Gln Ile
    2600                 2605                 2610

Gly Val  Phe Lys Gly Ser Asn  Gly Phe Glu Tyr Phe  Ala Pro Ala
    2615                 2620                 2625

Asn Thr  Asp Ala Asn Asn Ile  Glu Gly Gln Ala Ile  Arg Tyr Gln
    2630                 2635                 2640
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Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly
2705 2710

<210> 98
<211> 2710
<212> PRT
<213> Clostridium difficile

<400> 98

Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1 5 10 15

Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
20 25 30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
35 40 45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr
50 55 60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65 70 75 80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
85 90 95

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```
Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
            100                 105                 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
        115                 120                 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
    130                 135                 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
    290                 295                 300
```

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```
Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
                325                 330                 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
            340                 345                 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
        355                 360                 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
    370                 375                 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385                 390                 395                 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
                405                 410                 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
            420                 425                 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
        435                 440                 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
    450                 455                 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465                 470                 475                 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
                485                 490                 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
            500                 505                 510
```

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```
Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
        515                 520                 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
    530                 535                 540

Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545                 550                 555                 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
                565                 570                 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
            580                 585                 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
        595                 600                 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
    610                 615                 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625                 630                 635                 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
                645                 650                 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
            660                 665                 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
        675                 680                 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
    690                 695                 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705                 710                 715                 720
```

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```
Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser
                725                 730                 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
            740                 745                 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
        755                 760                 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
    770                 775                 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785                 790                 795                 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
                805                 810                 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
            820                 825                 830

Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
        835                 840                 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
    850                 855                 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865                 870                 875                 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
                885                 890                 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
            900                 905                 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
        915                 920                 925
```

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```
Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
    930                 935                 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945                 950                 955                 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
                965                 970                 975

Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
            980                 985                 990

Ala Gln Leu Phe Ser Thr Gly Leu  Asn Thr Ile Tyr Asp  Ser Ile Gln
        995                 1000                1005

Leu Val  Asn Leu Ile Ser Asn  Ala Val Asn Asp Thr  Ile Asn Val
    1010                1015                1020

Leu Pro  Thr Ile Thr Glu Gly  Ile Pro Ile Val Ser  Thr Ile Leu
    1025                1030                1035

Asp Gly  Ile Asn Leu Gly Ala  Ala Ile Lys Glu Leu  Leu Asp Glu
    1040                1045                1050

His Asp  Pro Leu Leu Lys Lys  Glu Leu Glu Ala Lys  Val Gly Val
    1055                1060                1065

Leu Ala  Ile Asn Met Ser Leu  Ser Ile Ala Ala Thr  Val Ala Ser
    1070                1075                1080

Ile Val  Gly Ile Gly Ala Glu  Val Thr Ile Phe Leu  Leu Pro Ile
    1085                1090                1095

Ala Gly  Ile Ser Ala Gly Ile  Pro Ser Leu Val Asn  Asn Glu Leu
    1100                1105                1110

Ile Leu  His Asp Lys Ala Thr  Ser Val Val Asn Tyr  Phe Asn His
    1115                1120                1125
```

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```
Leu Ser  Glu Ser Lys Lys Tyr  Gly Pro Leu Lys Thr  Glu Asp Asp
    1130                1135                1140

Lys Ile  Leu Val Pro Ile Asp  Asp Leu Val Ile Ser  Glu Ile Asp
    1145                1150                1155

Phe Asn  Asn Asn Ser Ile Lys  Leu Gly Thr Cys Asn  Ile Leu Ala
    1160                1165                1170

Met Glu  Gly Gly Ser Gly His  Thr Val Thr Gly Asn  Ile Asp His
    1175                1180                1185

Phe Phe  Ser Ser Pro Ser Ile  Ser Ser His Ile Pro  Ser Leu Ser
    1190                1195                1200

Ile Tyr  Ser Ala Ile Gly Ile  Glu Thr Glu Asn Leu  Asp Phe Ser
    1205                1210                1215

Lys Lys  Ile Met Met Leu Pro  Asn Ala Pro Ser Arg  Val Phe Trp
    1220                1225                1230

Trp Glu  Thr Gly Ala Val Pro  Gly Leu Arg Ser Leu  Glu Asn Asp
    1235                1240                1245

Gly Thr  Arg Leu Leu Asp Ser  Ile Arg Asp Leu Tyr  Pro Gly Lys
    1250                1255                1260

Phe Tyr  Trp Arg Phe Tyr Ala  Phe Phe Asp Tyr Ala  Ile Thr Thr
    1265                1270                1275

Leu Lys  Pro Val Tyr Glu Asp  Thr Asn Ile Lys Ile  Lys Leu Asp
    1280                1285                1290

Lys Asp  Thr Arg Asn Phe Ile  Met Pro Thr Ile Thr  Thr Asn Glu
    1295                1300                1305

Ile Arg  Asn Lys Leu Ser Tyr  Ser Phe Asp Gly Ala  Gly Gly Thr
    1310                1315                1320
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```
Tyr Ser  Leu Leu Leu Ser Ser  Tyr Pro Ile Ser Thr  Asn Ile Asn
    1325                1330                1335

Leu Ser  Lys Asp Asp Leu Trp  Ile Phe Asn Ile Asp  Asn Glu Val
    1340                1345                1350

Arg Glu  Ile Ser Ile Glu Asn  Gly Thr Ile Lys Lys  Gly Lys Leu
    1355                1360                1365

Ile Lys  Asp Val Leu Ser Lys  Ile Asp Ile Asn Lys  Asn Lys Leu
    1370                1375                1380

Ile Ile  Gly Asn Gln Thr Ile  Asp Phe Ser Gly Asp  Ile Asp Asn
    1385                1390                1395

Lys Asp  Arg Tyr Ile Phe Leu  Thr Cys Glu Leu Asp  Asp Lys Ile
    1400                1405                1410

Ser Leu  Ile Ile Glu Ile Asn  Leu Val Ala Lys Ser  Tyr Ser Leu
    1415                1420                1425

Leu Leu  Ser Gly Asp Lys Asn  Tyr Leu Ile Ser Asn  Leu Ser Asn
    1430                1435                1440

Thr Ile  Glu Lys Ile Asn Thr  Leu Gly Leu Asp Ser  Lys Asn Ile
    1445                1450                1455

Ala Tyr  Asn Tyr Thr Asp Glu  Ser Asn Asn Lys Tyr  Phe Gly Ala
    1460                1465                1470

Ile Ser  Lys Thr Ser Gln Lys  Ser Ile Ile His Tyr  Lys Lys Asp
    1475                1480                1485

Ser Lys  Asn Ile Leu Glu Phe  Tyr Asn Asp Ser Thr  Leu Glu Phe
    1490                1495                1500

Asn Ser  Lys Asp Phe Ile Ala  Glu Asp Ile Asn Val  Phe Met Lys
    1505                1510                1515
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Asp Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn
1520 1525 1530

Thr Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn
1535 1540 1545

Gln Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser
1550 1555 1560

Ser Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr
1565 1570 1575

Ser Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys
1580 1585 1590

Leu Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe
1595 1600 1605

Thr Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys
1610 1615 1620

Asp Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr
1625 1630 1635

Ser Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val
1640 1645 1650

Val Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser
1655 1660 1665

Thr Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg
1670 1675 1680

Tyr Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu
1685 1690 1695

Ile Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu
1700 1705 1710

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Ile Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile
1715 1720 1725

Asn Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly
1730 1735 1740

Ser Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys
1745 1750 1755

Ile Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln
1760 1765 1770

Ser Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu
1775 1780 1785

Ser Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu
1790 1795 1800

Asn Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn
1805 1810 1815

Lys Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu
1820 1825 1830

Ile Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe
1835 1840 1845

Asn Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr
1850 1855 1860

Phe Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile
1865 1870 1875

Asn Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu
1880 1885 1890

Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala
1895 1900 1905

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```
Asn Thr  Gln Asn Asn Asn Ile  Glu Gly Gln Ala Ile  Val Tyr Gln
    1910                1915                1920

Ser Lys  Phe Leu Thr Leu Asn  Gly Lys Lys Tyr Tyr  Phe Asp Asn
    1925                1930                1935

Asn Ser  Lys Ala Val Thr Gly  Trp Arg Ile Ile Asn  Asn Glu Lys
    1940                1945                1950

Tyr Tyr  Phe Asn Pro Asn Asn  Ala Ile Ala Ala Val  Gly Leu Gln
    1955                1960                1965

Val Ile  Asp Asn Asn Lys Tyr  Tyr Phe Asn Pro Asp  Thr Ala Ile
    1970                1975                1980

Ile Ser  Lys Gly Trp Gln Thr  Val Asn Gly Ser Arg  Tyr Tyr Phe
    1985                1990                1995

Asp Thr  Asp Thr Ala Ile Ala  Phe Asn Gly Tyr Lys  Thr Ile Asp
    2000                2005                2010

Gly Lys  His Phe Tyr Phe Asp  Ser Asp Cys Val Val  Lys Ile Gly
    2015                2020                2025

Val Phe  Ser Thr Ser Asn Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2030                2035                2040

Thr Tyr  Asn Asn Asn Ile Glu  Gly Gln Ala Ile Val  Tyr Gln Ser
    2045                2050                2055

Lys Phe  Leu Thr Leu Asn Gly  Lys Lys Tyr Tyr Phe  Asp Asn Asn
    2060                2065                2070

Ser Lys  Ala Val Thr Gly Trp  Gln Thr Ile Asp Ser  Lys Lys Tyr
    2075                2080                2085

Tyr Phe  Asn Thr Asn Thr Ala  Glu Ala Ala Thr Gly  Trp Gln Thr
    2090                2095                2100
```

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```
Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr Asn Thr  Ala Glu Ala
    2105                 2110                 2115

Ala Thr  Gly Trp Gln Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn
    2120                 2125                 2130

Thr Asn  Thr Ala Ile Ala Ser  Thr Gly Tyr Thr Ile  Ile Asn Gly
    2135                 2140                 2145

Lys His  Phe Tyr Phe Asn Thr  Asp Gly Ile Met Gln  Ile Gly Val
    2150                 2155                 2160

Phe Lys  Gly Pro Asn Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr
    2165                 2170                 2175

Asp Ala  Asn Asn Ile Glu Gly  Gln Ala Ile Leu Tyr  Gln Asn Glu
    2180                 2185                 2190

Phe Leu  Thr Leu Asn Gly Lys  Lys Tyr Tyr Phe Gly  Ser Asp Ser
    2195                 2200                 2205

Lys Ala  Val Thr Gly Trp Arg  Ile Ile Asn Asn Lys  Lys Tyr Tyr
    2210                 2215                 2220

Phe Asn  Pro Asn Asn Ala Ile  Ala Ala Ile His Leu  Cys Thr Ile
    2225                 2230                 2235

Asn Asn  Asp Lys Tyr Tyr Phe  Ser Tyr Asp Gly Ile  Leu Gln Asn
    2240                 2245                 2250

Gly Tyr  Ile Thr Ile Glu Arg  Asn Asn Phe Tyr Phe  Asp Ala Asn
    2255                 2260                 2265

Asn Glu  Ser Lys Met Val Thr  Gly Val Phe Lys Gly  Pro Asn Gly
    2270                 2275                 2280

Phe Glu  Tyr Phe Ala Pro Ala  Asn Thr His Asn Asn  Asn Ile Glu
    2285                 2290                 2295
```

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```
Gly Gln  Ala Ile Val Tyr Gln  Asn Lys Phe Leu Thr  Leu Asn Gly
    2300                2305                2310

Lys Lys  Tyr Tyr Phe Asp Asn  Asp Ser Lys Ala Val  Thr Gly Trp
    2315                2320                2325

Gln Thr  Ile Asp Gly Lys Lys  Tyr Tyr Phe Asn Leu  Asn Thr Ala
    2330                2335                2340

Glu Ala  Ala Thr Gly Trp Gln  Thr Ile Asp Gly Lys  Lys Tyr Tyr
    2345                2350                2355

Phe Asn  Leu Asn Thr Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile
    2360                2365                2370

Asp Gly  Lys Lys Tyr Tyr Phe  Asn Thr Asn Thr Phe  Ile Ala Ser
    2375                2380                2385

Thr Gly  Tyr Thr Ser Ile Asn  Gly Lys His Phe Tyr  Phe Asn Thr
    2390                2395                2400

Asp Gly  Ile Met Gln Ile Gly  Val Phe Lys Gly Pro  Asn Gly Phe
    2405                2410                2415

Glu Tyr  Phe Ala Pro Ala Asn  Thr His Asn Asn Asn  Ile Glu Gly
    2420                2425                2430

Gln Ala  Ile Leu Tyr Gln Asn  Lys Phe Leu Thr Leu  Asn Gly Lys
    2435                2440                2445

Lys Tyr  Tyr Phe Gly Ser Asp  Ser Lys Ala Val Thr  Gly Leu Arg
    2450                2455                2460

Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn Thr Asn  Thr Ala Val
    2465                2470                2475

Ala Val  Thr Gly Trp Gln Thr  Ile Asn Gly Lys Lys  Tyr Tyr Phe
    2480                2485                2490
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Asn Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser
2495 2500 2505

Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly
2510 2515 2520

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2525 2530 2535

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2540 2545 2550

Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn
2555 2560 2565

Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr
2570 2575 2580

Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr
2585 2590 2595

Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile
2600 2605 2610

Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala
2615 2620 2625

Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln
2630 2635 2640

Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

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Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly
2705 2710

<210> 99
<211> 2710
<212> PRT
<213> Clostridium difficile

<400> 99

Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1 5 10 15

Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
20 25 30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
35 40 45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn
50 55 60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65 70 75 80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
100 105 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
115 120 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
130 135 140

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```
Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Val Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
    290                 295                 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
                325                 330                 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
            340                 345                 350
```

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```
Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
        355                 360                 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
    370                 375                 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385                 390                 395                 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
                405                 410                 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
            420                 425                 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
        435                 440                 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
    450                 455                 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465                 470                 475                 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
                485                 490                 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
            500                 505                 510

Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
        515                 520                 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
    530                 535                 540

Asp Asn Glu Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545                 550                 555                 560
```

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```
Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
                565                 570                 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
            580                 585                 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
        595                 600                 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
    610                 615                 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625                 630                 635                 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
                645                 650                 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
            660                 665                 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
        675                 680                 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
    690                 695                 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705                 710                 715                 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser
                725                 730                 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
            740                 745                 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
        755                 760                 765
```

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```
Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
    770                 775                 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785                 790                 795                 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Thr Ser Val Ser
                805                 810                 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
            820                 825                 830

Ser Val Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
        835                 840                 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
    850                 855                 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865                 870                 875                 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
                885                 890                 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
            900                 905                 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
        915                 920                 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
    930                 935                 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945                 950                 955                 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
                965                 970                 975
```

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```
Lys Asp Leu Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
            980                 985                 990

Ala Gln Leu Phe Ser Thr Gly Leu  Asn Thr Ile Tyr Asp  Ser Ile Gln
        995                 1000                1005

Leu Val  Asn Leu Ile Ser Asn  Ala Val Asn Asp Thr  Ile Asn Val
    1010                1015                1020

Leu Pro  Thr Ile Thr Glu Gly  Ile Pro Ile Val Ser  Thr Ile Leu
    1025                1030                1035

Asp Gly  Ile Asn Leu Gly Ala  Ala Ile Lys Glu Leu  Leu Asp Glu
    1040                1045                1050

His Asp  Pro Leu Leu Lys Lys  Glu Leu Glu Ala Lys  Val Gly Val
    1055                1060                1065

Leu Ala  Ile Asn Met Ser Leu  Ser Ile Ala Ala Thr  Val Ala Ser
    1070                1075                1080

Ile Val  Gly Ile Gly Ala Glu  Val Thr Ile Phe Leu  Leu Pro Ile
    1085                1090                1095

Ala Gly  Ile Ser Ala Gly Ile  Pro Ser Leu Val Asn  Asn Glu Leu
    1100                1105                1110

Ile Leu  His Asp Lys Ala Thr  Ser Val Val Asn Tyr  Phe Asn His
    1115                1120                1125

Leu Ser  Glu Ser Lys Glu Tyr  Gly Pro Leu Lys Thr  Glu Asp Asp
    1130                1135                1140

Lys Ile  Leu Val Pro Ile Asp  Asp Leu Val Ile Ser  Glu Ile Asp
    1145                1150                1155

Phe Asn  Asn Asn Ala Ile Lys  Leu Gly Thr Cys Asn  Ile Leu Ala
    1160                1165                1170
```

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```
Met Glu  Gly Gly Ser Gly His  Thr Val Thr Gly Asn  Ile Asp His
    1175                1180                1185

Phe Phe  Ser Ser Pro Ser Ile  Ser Ser His Ile Pro  Ser Leu Ser
    1190                1195                1200

Ile Tyr  Ser Ala Ile Gly Ile  Lys Thr Glu Asn Leu  Asp Phe Ser
    1205                1210                1215

Lys Lys  Ile Met Met Leu Pro  Asn Ala Pro Ser Arg  Val Phe Trp
    1220                1225                1230

Trp Glu  Thr Gly Ala Val Pro  Gly Leu Arg Ser Leu  Glu Asn Asn
    1235                1240                1245

Gly Thr  Lys Leu Leu Asp Ser  Ile Arg Asp Leu Tyr  Pro Gly Lys
    1250                1255                1260

Phe Tyr  Trp Arg Phe Tyr Ala  Phe Phe Asp Tyr Ala  Ile Thr Thr
    1265                1270                1275

Leu Lys  Pro Val Tyr Glu Asp  Thr Asn Ile Lys Ile  Lys Leu Asp
    1280                1285                1290

Lys Asp  Thr Arg Asn Phe Ile  Met Pro Thr Ile Thr  Thr Asn Glu
    1295                1300                1305

Ile Arg  Asn Lys Leu Ser Tyr  Ser Phe Asp Gly Ala  Gly Gly Thr
    1310                1315                1320

Tyr Ser  Leu Leu Leu Ser Ser  Tyr Pro Ile Ser Thr  Asn Ile Asn
    1325                1330                1335

Leu Ser  Lys Asp Asp Leu Trp  Ile Phe Asn Ile Asp  Asn Glu Val
    1340                1345                1350

Arg Glu  Ile Ser Ile Glu Asn  Gly Thr Ile Lys Lys  Gly Lys Leu
    1355                1360                1365
```

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```
Ile Lys  Asp Val Leu Ser Lys  Ile Asp Ile Asn Lys  Asn Lys Leu
    1370                1375                1380

Ile Ile  Gly Asn Gln Thr Ile  Asp Phe Ser Gly Asp  Ile Asp Asn
    1385                1390                1395

Lys Asp  Arg Tyr Ile Phe Leu  Thr Cys Glu Leu Asp  Asp Lys Ile
    1400                1405                1410

Ser Leu  Ile Ile Glu Ile Asn  Leu Val Ala Lys Ser  Tyr Ser Leu
    1415                1420                1425

Leu Leu  Ser Gly Asp Lys Asn  Tyr Leu Ile Ser Asn  Leu Ser Asn
    1430                1435                1440

Thr Ile  Glu Lys Ile Asn Thr  Leu Gly Leu Asp Ser  Lys Asn Ile
    1445                1450                1455

Ala Tyr  Asn Tyr Thr Asp Glu  Ser Asn Asn Lys Tyr  Phe Gly Ala
    1460                1465                1470

Ile Ser  Lys Thr Ser Gln Lys  Ser Ile Ile His Tyr  Lys Lys Asp
    1475                1480                1485

Ser Lys  Asn Ile Leu Glu Phe  Tyr Asn Gly Ser Thr  Leu Glu Phe
    1490                1495                1500

Asn Ser  Lys Asp Phe Ile Ala  Glu Asp Ile Asn Val  Phe Met Lys
    1505                1510                1515

Asp Asp  Ile Asn Thr Ile Thr  Gly Lys Tyr Tyr Val  Asp Asn Asn
    1520                1525                1530

Thr Asp  Lys Ser Ile Asp Phe  Ser Ile Ser Leu Val  Ser Lys Asn
    1535                1540                1545

Gln Ala  Lys Val Asn Gly Leu  Tyr Leu Asn Glu Ser  Val Tyr Ser
    1550                1555                1560
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```
Ser Tyr  Leu Asp Phe Val Lys  Asn Ala Asp Gly His  His Asn Thr
    1565                1570                1575

Ser Asn  Phe Met Asn Leu Phe  Leu Asp Asn Ile Ser  Phe Trp Lys
    1580                1585                1590

Leu Phe  Gly Phe Glu Asn Ile  Asn Phe Val Val Asp  Lys Tyr Phe
    1595                1600                1605

Thr Leu  Val Gly Lys Thr Asn  Leu Gly Tyr Val Glu  Phe Ile Cys
    1610                1615                1620

Asp Asn  Asn Lys Asn Ile Asp  Ile Tyr Phe Gly Glu  Trp Lys Thr
    1625                1630                1635

Ser Ser  Ser Lys Ser Thr Ile  Phe Ser Gly Asn Gly  Arg Asn Val
    1640                1645                1650

Val Val  Glu Pro Ile Tyr Asn  Pro Asp Thr Gly Glu  Asp Ile Ser
    1655                1660                1665

Thr Ser  Leu Asp Phe Ser Tyr  Glu Pro Leu Tyr Gly  Ile Asp Arg
    1670                1675                1680

Tyr Ile  Asn Lys Val Leu Ile  Ala Pro Asp Leu Tyr  Thr Ser Leu
    1685                1690                1695

Ile Asn  Ile Asn Thr Asn Tyr  Tyr Ser Asn Glu Tyr  Tyr Pro Glu
    1700                1705                1710

Ile Ile  Val Leu Asn Pro Asn  Thr Phe His Lys Lys  Val Asn Ile
    1715                1720                1725

Asn Leu  Asp Ser Ser Ser Phe  Glu Tyr Lys Trp Ser  Thr Glu Gly
    1730                1735                1740

Ser Asp  Phe Ile Leu Val Arg  Tyr Leu Glu Glu Ser  Asn Lys Lys
    1745                1750                1755
```

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```
Ile Leu  Gln Lys Ile Arg Ile  Lys Gly Ile Leu Ser  Asn Thr Gln
    1760                1765                1770

Ser Phe  Asn Lys Met Ser Ile  Asp Phe Lys Asp Ile  Lys Lys Leu
    1775                1780                1785

Ser Leu  Val Tyr Ile Met Ser  Asn Phe Lys Ser Phe  Asn Ser Glu
    1790                1795                1800

Asn Glu  Leu Asp Arg Asp His  Leu Gly Phe Lys Ile  Ile Asp Asn
    1805                1810                1815

Lys Thr  Tyr Tyr Tyr Asp Glu  Ala Ser Lys Leu Val  Lys Gly Leu
    1820                1825                1830

Ile Asn  Ile Asn Asn Ser Leu  Phe Tyr Phe Asp Pro  Ile Glu Ser
    1835                1840                1845

Asn Leu  Val Thr Gly Trp Gln  Thr Ile Asn Gly Lys  Lys Tyr Tyr
    1850                1855                1860

Phe Asp  Ile Asn Thr Gly Ala  Ala Leu Thr Ser Tyr  Lys Ile Ile
    1865                1870                1875

Asn Gly  Lys His Phe Tyr Phe  Asn Asn Asn Gly Val  Met Gln Leu
    1880                1885                1890

Gly Val  Phe Lys Gly Pro Asp  Arg Phe Glu Tyr Phe  Ala Pro Ala
    1895                1900                1905

Asn Thr  Gln Asn Asn Asn Ile  Glu Gly Gln Ala Ile  Val Tyr Gln
    1910                1915                1920

Ser Lys  Phe Leu Thr Leu Asn  Gly Lys Lys Tyr Tyr  Phe Asp Asn
    1925                1930                1935

Asp Ser  Lys Ala Val Thr Gly  Trp Arg Ile Ile Asn  Asn Glu Lys
    1940                1945                1950
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Tyr Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln
1955 1960 1965

Val Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile
1970 1975 1980

Ile Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe
1985 1990 1995

Asp Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp
2000 2005 2010

Gly Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly
2015 2020 2025

Val Phe Ser Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2030 2035 2040

Thr Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
2045 2050 2055

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
2060 2065 2070

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr
2075 2080 2085

Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr
2090 2095 2100

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Val
2105 2110 2115

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2120 2125 2130

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
2135 2140 2145

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```
Lys His  Phe Tyr Phe Asn Thr  Asp Gly Ile Met Gln  Ile Gly Val
    2150                2155                2160

Phe Lys  Gly Pro Asp Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr
    2165                2170                2175

Asp Ala  Asn Asn Ile Glu Gly  Gln Ala Ile Leu Tyr  Gln Asn Lys
    2180                2185                2190

Phe Leu  Thr Leu Asn Gly Lys  Lys Tyr Tyr Phe Ala  Ser Asp Ser
    2195                2200                2205

Lys Ala  Val Thr Gly Trp Arg  Ile Ile Asn Asn Lys  Lys Tyr Tyr
    2210                2215                2220

Phe Asn  Pro Asn Asn Ala Ile  Ala Ala Thr His Leu  Tyr Thr Ile
    2225                2230                2235

Asn Asn  Asp Lys Tyr Tyr Phe  Ser Tyr Asp Gly Ile  Leu Gln Asn
    2240                2245                2250

Gly Tyr  Ile Thr Ile Glu Arg  Asn Asn Phe Tyr Phe  Asp Ala Asn
    2255                2260                2265

Asn Glu  Ser Lys Met Val Thr  Gly Val Phe Lys Gly  Pro Asn Gly
    2270                2275                2280

Phe Glu  Tyr Phe Ala Pro Ala  Asn Thr His Asn Asn  Asn Ile Glu
    2285                2290                2295

Gly Gln  Ala Ile Val Tyr Gln  Asn Lys Phe Leu Thr  Leu Asn Gly
    2300                2305                2310

Lys Lys  Tyr Tyr Phe Asp Asn  Asp Ser Lys Ala Val  Thr Gly Trp
    2315                2320                2325

Gln Thr  Ile Asp Gly Lys Lys  Tyr Tyr Phe Asn Leu  Asn Thr Ala
    2330                2335                2340
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```
Val Ala  Val Thr Gly Trp Gln  Thr Ile Asp Gly Lys  Lys Tyr Tyr
    2345                2350                2355

Phe Asn  Thr Asn Thr Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile
    2360                2365                2370

Asp Gly  Lys Lys Tyr Tyr Phe  Asn Thr Asn Thr Ser  Ile Ala Ser
    2375                2380                2385

Thr Gly  Tyr Thr Ile Ile Asn  Gly Lys His Phe Tyr  Phe Asn Thr
    2390                2395                2400

Asp Gly  Ile Met Gln Ile Gly  Val Phe Lys Gly Pro  Asp Gly Phe
    2405                2410                2415

Glu Tyr  Phe Ala Pro Ala Asn  Thr Asp Ala Asn Asn  Ile Glu Gly
    2420                2425                2430

Gln Ala  Ile Leu Tyr Gln Asn  Lys Phe Leu Thr Leu  Asn Gly Lys
    2435                2440                2445

Lys Tyr  Tyr Phe Ala Ser Asp  Ser Lys Ala Val Thr  Gly Leu Arg
    2450                2455                2460

Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn Thr Asn  Thr Ala Glu
    2465                2470                2475

Ala Ala  Thr Gly Trp Gln Thr  Ile Asp Gly Lys Lys  Tyr Tyr Phe
    2480                2485                2490

Asn Thr  Asn Thr Ser Ile Ala  Ser Thr Gly Tyr Thr  Ile Ile Asn
    2495                2500                2505

Asp Lys  His Phe Tyr Phe Asn  Thr Asp Gly Ile Met  Gln Ile Gly
    2510                2515                2520

Val Phe  Lys Gly Pro Asp Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2525                2530                2535
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Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2540 2545 2550

Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn
2555 2560 2565

Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Arg Arg Tyr
2570 2575 2580

Tyr Phe Glu Pro Asn Thr Ala Ile Gly Ala Asn Gly Tyr Lys Ile
2585 2590 2595

Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile
2600 2605 2610

Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala
2615 2620 2625

Asn Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg Tyr Gln
2630 2635 2640

Asn Arg Phe Leu His Leu Leu Gly Asn Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Asn Met
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly
2705 2710

<210> 100
<211> 2710
<212> PRT
<213> Clostridium difficile

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<400> 100

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Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1               5                  10                  15

Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
            20                  25                  30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
        35                  40                  45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr
    50                  55                  60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65                  70                  75                  80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
            100                 105                 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
        115                 120                 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
    130                 135                 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
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        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
    290                 295                 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
                325                 330                 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
            340                 345                 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
        355                 360                 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
    370                 375                 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385                 390                 395                 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
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405 410 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
420 425 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
435 440 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
450 455 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465 470 475 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
485 490 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
500 505 510

Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
515 520 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
530 535 540

Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545 550 555 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
565 570 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
580 585 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
595 600 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser

610 615 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625 630 635 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
645 650 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
660 665 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
675 680 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
690 695 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705 710 715 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser
725 730 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
740 745 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
755 760 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
770 775 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785 790 795 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
805 810 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser

820 825 830

Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
835 840 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
850 855 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865 870 875 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
885 890 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
900 905 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
915 920 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
930 935 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945 950 955 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
965 970 975

Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
980 985 990

Ala Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln
995 1000 1005

Leu Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val
1010 1015 1020

Leu Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu

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1025 1030 1035

Asp Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu
1040 1045 1050

His Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val
1055 1060 1065

Leu Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser
1070 1075 1080

Ile Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile
1085 1090 1095

Ala Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu
1100 1105 1110

Ile Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His
1115 1120 1125

Leu Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp
1130 1135 1140

Lys Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp
1145 1150 1155

Phe Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala
1160 1165 1170

Met Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His
1175 1180 1185

Phe Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser
1190 1195 1200

Ile Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser
1205 1210 1215

Lys Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp

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1220 1225 1230

Trp Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp
1235 1240 1245

Gly Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys
1250 1255 1260

Phe Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr
1265 1270 1275

Leu Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp
1280 1285 1290

Lys Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu
1295 1300 1305

Ile Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr
1310 1315 1320

Tyr Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn
1325 1330 1335

Leu Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val
1340 1345 1350

Arg Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu
1355 1360 1365

Ile Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu
1370 1375 1380

Ile Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn
1385 1390 1395

Lys Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile
1400 1405 1410

Ser Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu

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1415 1420 1425

Leu Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn
1430 1435 1440

Thr Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile
1445 1450 1455

Ala Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala
1460 1465 1470

Ile Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp
1475 1480 1485

Ser Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe
1490 1495 1500

Asn Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys
1505 1510 1515

Asp Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn
1520 1525 1530

Thr Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn
1535 1540 1545

Gln Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser
1550 1555 1560

Ser Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr
1565 1570 1575

Ser Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys
1580 1585 1590

Leu Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe
1595 1600 1605

Thr Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys

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1610 1615 1620

Asp Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr
1625 1630 1635

Ser Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val
1640 1645 1650

Val Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser
1655 1660 1665

Thr Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg
1670 1675 1680

Tyr Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu
1685 1690 1695

Ile Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu
1700 1705 1710

Ile Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile
1715 1720 1725

Asn Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly
1730 1735 1740

Ser Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys
1745 1750 1755

Ile Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln
1760 1765 1770

Ser Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu
1775 1780 1785

Ser Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu
1790 1795 1800

Asn Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn

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1805 1810 1815

Lys Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu
1820 1825 1830

Ile Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe
1835 1840 1845

Asn Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr
1850 1855 1860

Phe Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile
1865 1870 1875

Asn Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu
1880 1885 1890

Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala
1895 1900 1905

Asn Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln
1910 1915 1920

Ser Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn
1925 1930 1935

Asp Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys
1940 1945 1950

Tyr Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln
1955 1960 1965

Val Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile
1970 1975 1980

Ile Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe
1985 1990 1995

Asp Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp

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2000 2005 2010

Gly Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly
2015 2020 2025

Val Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2030 2035 2040

Thr Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
2045 2050 2055

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
2060 2065 2070

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr
2075 2080 2085

Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr
2090 2095 2100

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala
2105 2110 2115

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2120 2125 2130

Thr Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
2135 2140 2145

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Lys Ile Gly Val
2150 2155 2160

Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2165 2170 2175

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu
2180 2185 2190

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser

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2195 2200 2205

Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile
2225 2230 2235

Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn
2240 2245 2250

Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn
2255 2260 2265

Asn Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly
2270 2275 2280

Phe Glu Tyr Phe Ala Pro Ala Asn Thr Tyr Asn Asn Asn Ile Glu
2285 2290 2295

Gly Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly
2300 2305 2310

Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp
2315 2320 2325

Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala
2330 2335 2340

Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr
2345 2350 2355

Phe Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2360 2365 2370

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser
2375 2380 2385

Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr

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2390 2395 2400

Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe
2405 2410 2415

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2420 2425 2430

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2435 2440 2445

Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg
2450 2455 2460

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val
2465 2470 2475

Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
2480 2485 2490

Asn Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser
2495 2500 2505

Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly
2510 2515 2520

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2525 2530 2535

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2540 2545 2550

Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn
2555 2560 2565

Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr
2570 2575 2580

Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr

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2585 2590 2595

Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile
2600 2605 2610

Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala
2615 2620 2625

Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln
2630 2635 2640

Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly
2705 2710

<210> 101
<211> 2710
<212> PRT
<213> Clostridium difficile

<400> 101

Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1 5 10 15

Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
20 25 30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
35 40 45

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```
Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn
    50                  55                  60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65                  70                  75                  80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
            100                 105                 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
        115                 120                 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
    130                 135                 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Val Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255
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```
Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
    290                 295                 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
                325                 330                 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
            340                 345                 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
        355                 360                 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
    370                 375                 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385                 390                 395                 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
                405                 410                 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
            420                 425                 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
        435                 440                 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
    450                 455                 460
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Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465                 470                 475                 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
                485                 490                 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
            500                 505                 510

Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
        515                 520                 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
    530                 535                 540

Asp Asn Glu Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545                 550                 555                 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
                565                 570                 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
            580                 585                 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
        595                 600                 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
    610                 615                 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625                 630                 635                 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
                645                 650                 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
            660                 665                 670
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```
Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
        675                 680                 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
    690                 695                 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705                 710                 715                 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser
                725                 730                 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
            740                 745                 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
        755                 760                 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
    770                 775                 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785                 790                 795                 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Thr Ser Val Ser
                805                 810                 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
            820                 825                 830

Ser Val Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
        835                 840                 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
    850                 855                 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865                 870                 875                 880
```

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```
Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
                885                 890                 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
            900                 905                 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
        915                 920                 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
    930                 935                 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945                 950                 955                 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
                965                 970                 975

Lys Asp Leu Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
            980                 985                 990

Ala Gln Leu Phe Ser Thr Gly Leu  Asn Thr Ile Tyr Asp  Ser Ile Gln
        995                 1000                1005

Leu Val  Asn Leu Ile Ser Asn  Ala Val Asn Asp Thr  Ile Asn Val
    1010                1015                1020

Leu Pro  Thr Ile Thr Glu Gly  Ile Pro Ile Val Ser  Thr Ile Leu
    1025                1030                1035

Asp Gly  Ile Asn Leu Gly Ala  Ala Ile Lys Glu Leu  Leu Asp Glu
    1040                1045                1050

His Asp  Pro Leu Leu Lys Lys  Glu Leu Glu Ala Lys  Val Gly Val
    1055                1060                1065

Leu Ala  Ile Asn Met Ser Leu  Ser Ile Ala Ala Thr  Val Ala Ser
    1070                1075                1080
```

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```
Ile Val  Gly Ile Gly Ala Glu  Val Thr Ile Phe Leu  Leu Pro Ile
    1085                1090                1095

Ala Gly  Ile Ser Ala Gly Ile  Pro Ser Leu Val Asn  Asn Glu Leu
    1100                1105                1110

Ile Leu  His Asp Lys Ala Thr  Ser Val Val Asn Tyr  Phe Asn His
    1115                1120                1125

Leu Ser  Glu Ser Lys Glu Tyr  Gly Pro Leu Lys Thr  Glu Asp Asp
    1130                1135                1140

Lys Ile  Leu Val Pro Ile Asp  Asp Leu Val Ile Ser  Glu Ile Asp
    1145                1150                1155

Phe Asn  Asn Asn Ala Ile Lys  Leu Gly Thr Cys Asn  Ile Leu Ala
    1160                1165                1170

Met Glu  Gly Gly Ser Gly His  Thr Val Thr Gly Asn  Ile Asp His
    1175                1180                1185

Phe Phe  Ser Ser Pro Ser Ile  Ser Ser His Ile Pro  Ser Leu Ser
    1190                1195                1200

Ile Tyr  Ser Ala Ile Gly Ile  Lys Thr Glu Asn Leu  Asp Phe Ser
    1205                1210                1215

Lys Lys  Ile Met Met Leu Pro  Asn Ala Pro Ser Arg  Val Phe Trp
    1220                1225                1230

Trp Glu  Thr Gly Ala Val Pro  Gly Leu Arg Ser Leu  Glu Asn Asn
    1235                1240                1245

Gly Thr  Lys Leu Leu Asp Ser  Ile Arg Asp Leu Tyr  Pro Gly Lys
    1250                1255                1260

Phe Tyr  Trp Arg Phe Tyr Ala  Phe Phe Asp Tyr Ala  Ile Thr Thr
    1265                1270                1275
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Leu Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp
1280 1285 1290

Lys Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu
1295 1300 1305

Ile Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr
1310 1315 1320

Tyr Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn
1325 1330 1335

Leu Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val
1340 1345 1350

Arg Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu
1355 1360 1365

Ile Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu
1370 1375 1380

Ile Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn
1385 1390 1395

Lys Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile
1400 1405 1410

Ser Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu
1415 1420 1425

Leu Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn
1430 1435 1440

Thr Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile
1445 1450 1455

Ala Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala
1460 1465 1470

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```
Ile Ser  Lys Thr Ser Gln Lys  Ser Ile Ile His Tyr  Lys Lys Asp
    1475                1480                1485

Ser Lys  Asn Ile Leu Glu Phe  Tyr Asn Gly Ser Thr  Leu Glu Phe
    1490                1495                1500

Asn Ser  Lys Asp Phe Ile Ala  Glu Asp Ile Asn Val  Phe Met Lys
    1505                1510                1515

Asp Asp  Ile Asn Thr Ile Thr  Gly Lys Tyr Tyr Val  Asp Asn Asn
    1520                1525                1530

Thr Asp  Lys Ser Ile Asp Phe  Ser Ile Ser Leu Val  Ser Lys Asn
    1535                1540                1545

Gln Ala  Lys Val Asn Gly Leu  Tyr Leu Asn Glu Ser  Val Tyr Ser
    1550                1555                1560

Ser Tyr  Leu Asp Phe Val Lys  Asn Ala Asp Gly His  His Asn Thr
    1565                1570                1575

Ser Asn  Phe Met Asn Leu Phe  Leu Asp Asn Ile Ser  Phe Trp Lys
    1580                1585                1590

Leu Phe  Gly Phe Glu Asn Ile  Asn Phe Val Val Asp  Lys Tyr Phe
    1595                1600                1605

Thr Leu  Val Gly Lys Thr Asn  Leu Gly Tyr Val Glu  Phe Ile Cys
    1610                1615                1620

Asp Asn  Asn Lys Asn Ile Asp  Ile Tyr Phe Gly Glu  Trp Lys Thr
    1625                1630                1635

Ser Ser  Ser Lys Ser Thr Ile  Phe Ser Gly Asn Gly  Arg Asn Val
    1640                1645                1650

Val Val  Glu Pro Ile Tyr Asn  Pro Asp Thr Gly Glu  Asp Ile Ser
    1655                1660                1665
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Thr Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg
1670 1675 1680

Tyr Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu
1685 1690 1695

Ile Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu
1700 1705 1710

Ile Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile
1715 1720 1725

Asn Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly
1730 1735 1740

Ser Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys
1745 1750 1755

Ile Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln
1760 1765 1770

Ser Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu
1775 1780 1785

Ser Leu Val Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu
1790 1795 1800

Asn Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn
1805 1810 1815

Lys Thr Tyr Tyr Tyr Asp Glu Ala Ser Lys Leu Val Lys Gly Leu
1820 1825 1830

Ile Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Ser
1835 1840 1845

Asn Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr
1850 1855 1860

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```
Phe Asp  Ile Asn Thr Gly Ala  Ala Leu Thr Ser Tyr  Lys Ile Ile
    1865                1870                1875

Asn Gly  Lys His Phe Tyr Phe  Asn Asn Asn Gly Val  Met Gln Leu
    1880                1885                1890

Gly Val  Phe Lys Gly Pro Asp  Arg Phe Glu Tyr Phe  Ala Pro Ala
    1895                1900                1905

Asn Thr  Gln Asn Asn Asn Ile  Glu Gly Gln Ala Ile  Val Tyr Gln
    1910                1915                1920

Ser Lys  Phe Leu Thr Leu Asn  Gly Lys Lys Tyr Tyr  Phe Asp Asn
    1925                1930                1935

Asp Ser  Lys Ala Val Thr Gly  Trp Arg Ile Ile Asn  Asn Glu Lys
    1940                1945                1950

Tyr Tyr  Phe Asn Pro Asn Asn  Ala Ile Ala Ala Val  Gly Leu Gln
    1955                1960                1965

Val Ile  Asp Asn Asn Lys Tyr  Tyr Phe Asn Pro Asp  Thr Ala Ile
    1970                1975                1980

Ile Ser  Lys Gly Trp Gln Thr  Val Asn Gly Ser Arg  Tyr Tyr Phe
    1985                1990                1995

Asp Thr  Asp Thr Ala Ile Ala  Phe Asn Gly Tyr Lys  Thr Ile Asp
    2000                2005                2010

Gly Lys  His Phe Tyr Phe Asp  Ser Asp Cys Val Val  Lys Ile Gly
    2015                2020                2025

Val Phe  Ser Gly Ser Asn Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2030                2035                2040

Thr Tyr  Asn Asn Asn Ile Glu  Gly Gln Ala Ile Val  Tyr Gln Ser
    2045                2050                2055
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Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
2060 2065 2070

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr
2075 2080 2085

Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr
2090 2095 2100

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Val
2105 2110 2115

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2120 2125 2130

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
2135 2140 2145

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2150 2155 2160

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2165 2170 2175

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Lys
2180 2185 2190

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Ala Ser Asp Ser
2195 2200 2205

Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Asn Asn Ala Ile Ala Ala Thr His Leu Tyr Thr Ile
2225 2230 2235

Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn
2240 2245 2250

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```
Gly Tyr  Ile Thr Ile Glu Arg  Asn Asn Phe Tyr Phe  Asp Ala Asn
    2255                 2260                 2265

Asn Glu  Ser Lys Met Val Thr  Gly Val Phe Lys Gly  Pro Asn Gly
    2270                 2275                 2280

Phe Glu  Tyr Phe Ala Pro Ala  Asn Thr His Asn Asn  Asn Ile Glu
    2285                 2290                 2295

Gly Gln  Ala Ile Val Tyr Gln  Asn Lys Phe Leu Thr  Leu Asn Gly
    2300                 2305                 2310

Lys Lys  Tyr Tyr Phe Asp Asn  Asp Ser Lys Ala Val  Thr Gly Trp
    2315                 2320                 2325

Gln Thr  Ile Asp Gly Lys Lys  Tyr Tyr Phe Asn Leu  Asn Thr Ala
    2330                 2335                 2340

Val Ala  Val Thr Gly Trp Gln  Thr Ile Asp Gly Lys  Lys Tyr Tyr
    2345                 2350                 2355

Phe Asn  Thr Asn Thr Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile
    2360                 2365                 2370

Asp Gly  Lys Lys Tyr Tyr Phe  Asn Thr Asn Thr Ser  Ile Ala Ser
    2375                 2380                 2385

Thr Gly  Tyr Thr Ile Ile Asn  Gly Lys His Phe Tyr  Phe Asn Thr
    2390                 2395                 2400

Asp Gly  Ile Met Gln Ile Gly  Val Phe Lys Gly Pro  Asp Gly Phe
    2405                 2410                 2415

Glu Tyr  Phe Ala Pro Ala Asn  Thr Asp Ala Asn Asn  Ile Glu Gly
    2420                 2425                 2430

Gln Ala  Ile Leu Tyr Gln Asn  Lys Phe Leu Thr Leu  Asn Gly Lys
    2435                 2440                 2445
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```
Lys Tyr  Tyr Phe Ala Ser Asp  Ser Lys Ala Val Thr  Gly Leu Arg
    2450                 2455                 2460

Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn Thr Asn  Thr Ala Glu
    2465                 2470                 2475

Ala Ala  Thr Gly Trp Gln Thr  Ile Asp Gly Lys Lys  Tyr Tyr Phe
    2480                 2485                 2490

Asn Thr  Asn Thr Ser Ile Ala  Ser Thr Gly Tyr Thr  Ile Ile Asn
    2495                 2500                 2505

Asp Lys  His Phe Tyr Phe Asn  Thr Asp Gly Ile Met  Gln Ile Gly
    2510                 2515                 2520

Val Phe  Lys Gly Pro Asp Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2525                 2530                 2535

Thr Asp  Ala Asn Asn Ile Glu  Gly Gln Ala Ile Arg  Tyr Gln Asn
    2540                 2545                 2550

Arg Phe  Leu Tyr Leu His Asp  Asn Ile Tyr Tyr Phe  Gly Asn Asn
    2555                 2560                 2565

Ser Lys  Ala Ala Thr Gly Trp  Val Thr Ile Asp Gly  Arg Arg Tyr
    2570                 2575                 2580

Tyr Phe  Glu Pro Asn Thr Ala  Ile Gly Ala Asn Gly  Tyr Lys Ile
    2585                 2590                 2595

Ile Asp  Asn Lys Asn Phe Tyr  Phe Arg Asn Gly Leu  Pro Gln Ile
    2600                 2605                 2610

Gly Val  Phe Lys Gly Pro Asn  Gly Phe Glu Tyr Phe  Ala Pro Ala
    2615                 2620                 2625

Asn Thr  Asp Ala Asn Asn Ile  Asp Gly Gln Ala Ile  Arg Tyr Gln
    2630                 2635                 2640
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Asn Arg Phe Leu His Leu Leu Gly Asn Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Asn Met
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly
2705 2710

<210> 102
<211> 2710
<212> PRT
<213> Clostridium difficile

<400> 102

Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1 5 10 15

Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
20 25 30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
35 40 45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn
50 55 60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65 70 75 80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
85 90 95

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```
Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
            100                 105                 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
        115                 120                 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
    130                 135                 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Thr Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
    290                 295                 300
```

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```
Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
                325                 330                 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
            340                 345                 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
        355                 360                 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
    370                 375                 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385                 390                 395                 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
                405                 410                 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
            420                 425                 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
        435                 440                 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
    450                 455                 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465                 470                 475                 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
                485                 490                 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
            500                 505                 510
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Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
515 520 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
530 535 540

Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545 550 555 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
565 570 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
580 585 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
595 600 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
610 615 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625 630 635 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
645 650 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
660 665 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
675 680 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
690 695 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705 710 715 720

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```
Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser
                725                 730                 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
            740                 745                 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
        755                 760                 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
    770                 775                 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785                 790                 795                 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
                805                 810                 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
            820                 825                 830

Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
        835                 840                 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
    850                 855                 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865                 870                 875                 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
                885                 890                 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
            900                 905                 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
        915                 920                 925
```

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```
Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
    930                 935                 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945                 950                 955                 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
                965                 970                 975

Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
            980                 985                 990

Ala Gln Leu Phe Ser Thr Gly Leu  Asn Thr Ile Tyr Asp  Ser Ile Gln
        995                 1000                1005

Leu Val  Asn Leu Ile Ser Asn  Ala Val Asn Asp Thr  Ile Asn Val
    1010                1015                1020

Leu Pro  Thr Ile Thr Glu Gly  Ile Pro Ile Val Ser  Thr Ile Leu
    1025                1030                1035

Asp Gly  Ile Asn Leu Gly Ala  Ala Ile Lys Glu Leu  Leu Asp Glu
    1040                1045                1050

His Asp  Pro Leu Leu Lys Lys  Glu Leu Glu Ala Lys  Val Gly Val
    1055                1060                1065

Leu Ala  Ile Asn Met Ser Leu  Ser Ile Ala Ala Thr  Val Ala Ser
    1070                1075                1080

Ile Val  Gly Ile Gly Ala Glu  Val Thr Ile Phe Leu  Leu Pro Ile
    1085                1090                1095

Ala Gly  Ile Ser Ala Gly Ile  Pro Ser Leu Val Asn  Asn Glu Leu
    1100                1105                1110

Ile Leu  His Asp Lys Ala Thr  Ser Val Val Asn Tyr  Phe Asn His
    1115                1120                1125
```

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```
Leu Ser  Glu Ser Lys Lys Tyr  Gly Pro Leu Lys Thr  Glu Asp Asp
    1130                1135                1140

Lys Ile  Leu Val Pro Ile Asp  Asp Leu Val Ile Ser  Glu Ile Asp
    1145                1150                1155

Phe Asn  Asn Asn Ser Ile Lys  Leu Gly Thr Cys Asn  Ile Leu Ala
    1160                1165                1170

Met Glu  Gly Gly Ser Gly His  Thr Val Thr Gly Asn  Ile Asp His
    1175                1180                1185

Phe Phe  Ser Ser Pro Tyr Ile  Ser Ser His Ile Pro  Ser Leu Ser
    1190                1195                1200

Val Tyr  Ser Ala Ile Gly Ile  Lys Thr Glu Asn Leu  Asp Phe Ser
    1205                1210                1215

Lys Lys  Ile Met Met Leu Pro  Asn Ala Pro Ser Arg  Val Phe Trp
    1220                1225                1230

Trp Glu  Thr Gly Ala Val Pro  Gly Leu Arg Ser Leu  Glu Asn Asp
    1235                1240                1245

Gly Thr  Lys Leu Leu Asp Ser  Ile Arg Asp Leu Tyr  Pro Gly Lys
    1250                1255                1260

Phe Tyr  Trp Arg Phe Tyr Ala  Phe Phe Asp Tyr Ala  Ile Thr Thr
    1265                1270                1275

Leu Lys  Pro Val Tyr Glu Asp  Thr Asn Thr Lys Ile  Lys Leu Asp
    1280                1285                1290

Lys Asp  Thr Arg Asn Phe Ile  Met Pro Thr Ile Thr  Thr Asp Glu
    1295                1300                1305

Ile Arg  Asn Lys Leu Ser Tyr  Ser Phe Asp Gly Ala  Gly Gly Thr
    1310                1315                1320
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Tyr Ser  Leu Leu Leu Ser Ser  Tyr Pro Ile Ser Met  Asn Ile Asn
    1325                 1330                 1335

Leu Ser  Lys Asp Asp Leu Trp  Ile Phe Asn Ile Asp  Asn Glu Val
    1340                 1345                 1350

Arg Glu  Ile Ser Ile Glu Asn  Gly Thr Ile Lys Lys  Gly Asn Leu
    1355                 1360                 1365

Ile Glu  Asp Val Leu Ser Lys  Ile Asp Ile Asn Lys  Asn Lys Leu
    1370                 1375                 1380

Ile Ile  Gly Asn Gln Thr Ile  Asp Phe Ser Gly Asp  Ile Asp Asn
    1385                 1390                 1395

Lys Asp  Arg Tyr Ile Phe Leu  Thr Cys Glu Leu Asp  Asp Lys Ile
    1400                 1405                 1410

Ser Leu  Ile Ile Glu Ile Asn  Leu Val Ala Lys Ser  Tyr Ser Leu
    1415                 1420                 1425

Leu Leu  Ser Gly Asp Lys Asn  Tyr Leu Ile Ser Asn  Leu Ser Asn
    1430                 1435                 1440

Thr Ile  Glu Lys Ile Asn Thr  Leu Gly Leu Asp Ser  Lys Asn Ile
    1445                 1450                 1455

Ala Tyr  Asn Tyr Thr Asp Glu  Ser Asn Asn Lys Tyr  Phe Gly Ala
    1460                 1465                 1470

Ile Ser  Lys Thr Ser Gln Lys  Ser Ile Ile His Tyr  Lys Lys Asp
    1475                 1480                 1485

Ser Lys  Asn Ile Leu Glu Phe  Tyr Asn Gly Ser Thr  Leu Glu Phe
    1490                 1495                 1500

Asn Ser  Lys Asp Phe Ile Ala  Glu Asp Ile Asn Val  Phe Met Lys
    1505                 1510                 1515
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```
Asp Asp  Ile Asn Thr Ile Thr  Gly Lys Tyr Tyr Val  Asp Asn Asn
    1520                1525                1530

Thr Asp  Lys Ser Ile Asp Phe  Ser Ile Ser Leu Val  Ser Lys Asn
    1535                1540                1545

Gln Val  Lys Val Asn Gly Leu  Tyr Leu Asn Glu Ser  Val Tyr Ser
    1550                1555                1560

Ser Tyr  Leu Asp Phe Val Lys  Asn Ser Asp Gly His  His Asn Thr
    1565                1570                1575

Ser Asn  Phe Met Asn Leu Phe  Leu Asn Asn Ile Ser  Phe Trp Lys
    1580                1585                1590

Leu Phe  Gly Phe Glu Asn Ile  Asn Phe Val Ile Asp  Lys Tyr Phe
    1595                1600                1605

Thr Leu  Val Gly Lys Thr Asn  Leu Gly Tyr Val Glu  Phe Ile Cys
    1610                1615                1620

Asp Asn  Asn Lys Asn Ile Asp  Ile Tyr Phe Gly Glu  Trp Lys Thr
    1625                1630                1635

Leu Ser  Ser Lys Ser Thr Ile  Phe Ser Gly Asn Gly  Arg Asn Val
    1640                1645                1650

Val Val  Glu Pro Ile Tyr Asn  Pro Asp Thr Gly Glu  Asp Ile Ser
    1655                1660                1665

Thr Ser  Leu Asp Phe Ser Tyr  Glu Pro Leu Tyr Gly  Ile Asp Arg
    1670                1675                1680

Tyr Ile  Asn Lys Val Leu Ile  Ala Pro Asp Leu Tyr  Thr Ser Leu
    1685                1690                1695

Ile Asn  Ile Asn Thr Asn Tyr  Tyr Ser Asn Glu Tyr  Tyr Pro Glu
    1700                1705                1710
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Ile Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile
1715 1720 1725

Asn Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly
1730 1735 1740

Ser Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys
1745 1750 1755

Ile Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln
1760 1765 1770

Ser Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu
1775 1780 1785

Ser Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu
1790 1795 1800

Asn Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn
1805 1810 1815

Lys Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu
1820 1825 1830

Ile Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Ser
1835 1840 1845

Asn Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr
1850 1855 1860

Phe Asp Ile Asn Thr Gly Ala Ala Ser Thr Ser Tyr Lys Ile Ile
1865 1870 1875

Asn Gly Lys His Phe Tyr Phe Asn Asn Asn Gly Val Met Gln Leu
1880 1885 1890

Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala
1895 1900 1905

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```
Asn Thr  Gln Asn Asn Asn Ile  Glu Gly Gln Ala Ile  Val Tyr Gln
    1910                1915                1920

Ser Lys  Phe Leu Thr Leu Asn  Gly Lys Lys Tyr Tyr  Phe Asp Asn
    1925                1930                1935

Asp Ser  Lys Ala Val Thr Gly  Trp Arg Ile Ile Asn  Asn Glu Lys
    1940                1945                1950

Tyr Tyr  Phe Asn Pro Asn Asn  Ala Ile Ala Ala Val  Gly Leu Gln
    1955                1960                1965

Val Ile  Asp Asn Asn Lys Tyr  Tyr Phe Asn Pro Asp  Thr Ala Ile
    1970                1975                1980

Ile Ser  Lys Gly Trp Gln Thr  Val Asn Gly Ser Arg  Tyr Tyr Phe
    1985                1990                1995

Asp Thr  Asp Thr Ala Ile Ala  Phe Asn Gly Tyr Lys  Thr Ile Asp
    2000                2005                2010

Gly Lys  His Phe Tyr Phe Asp  Ser Asp Cys Val Val  Lys Ile Gly
    2015                2020                2025

Val Phe  Ser Gly Ser Asn Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2030                2035                2040

Thr Tyr  Asn Asn Asn Ile Glu  Gly Gln Ala Ile Val  Tyr Gln Ser
    2045                2050                2055

Lys Phe  Leu Thr Leu Asn Gly  Lys Lys Tyr Tyr Phe  Asp Asn Asn
    2060                2065                2070

Ser Lys  Ala Val Thr Gly Trp  Gln Thr Ile Asp Ser  Lys Lys Tyr
    2075                2080                2085

Tyr Phe  Asn Thr Asn Thr Ala  Glu Ala Ala Thr Gly  Trp Gln Thr
    2090                2095                2100
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```
Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr Asn Thr  Ala Glu Ala
    2105                 2110                 2115

Ala Thr  Gly Trp Gln Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn
    2120                 2125                 2130

Thr Asn  Thr Ser Ile Ala Ser  Thr Gly Tyr Thr Ile  Ile Asn Gly
    2135                 2140                 2145

Lys His  Phe Tyr Phe Asn Thr  Asp Gly Ile Met Gln  Ile Gly Val
    2150                 2155                 2160

Phe Lys  Gly Pro Asn Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr
    2165                 2170                 2175

Asp Ala  Asn Asn Ile Glu Gly  Gln Ala Ile Leu Tyr  Gln Asn Lys
    2180                 2185                 2190

Phe Leu  Thr Leu Asn Gly Lys  Lys Tyr Tyr Phe Gly  Ser Asp Ser
    2195                 2200                 2205

Lys Ala  Ile Thr Gly Trp Gln  Thr Ile Asp Gly Lys  Lys Tyr Tyr
    2210                 2215                 2220

Phe Asn  Pro Asn Asn Ala Ile  Ala Ala Thr His Leu  Cys Thr Ile
    2225                 2230                 2235

Asn Asn  Asp Lys Tyr Tyr Phe  Ser Tyr Asp Gly Ile  Leu Gln Asn
    2240                 2245                 2250

Gly Tyr  Ile Thr Ile Glu Arg  Asn Asn Phe Tyr Phe  Asp Ala Asn
    2255                 2260                 2265

Asn Glu  Ser Lys Met Val Thr  Gly Val Phe Lys Gly  Pro Asn Gly
    2270                 2275                 2280

Phe Glu  Tyr Phe Ala Pro Ala  Asn Thr His Asn Asn  Asn Ile Glu
    2285                 2290                 2295
```

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```
Gly Gln  Ala Ile Val Tyr Gln  Asn Lys Phe Leu Thr  Leu Asn Gly
    2300                2305                2310

Lys Lys  Tyr Tyr Phe Asp Asn  Asp Ser Lys Ala Val  Thr Gly Trp
    2315                2320                2325

Gln Thr  Ile Asp Ser Lys Lys  Tyr Tyr Phe Asn Leu  Asn Thr Ala
    2330                2335                2340

Val Ala  Val Thr Gly Trp Gln  Thr Ile Asp Gly Glu  Lys Tyr Tyr
    2345                2350                2355

Phe Asn  Leu Asn Thr Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile
    2360                2365                2370

Asp Gly  Lys Arg Tyr Tyr Phe  Asn Thr Asn Thr Tyr  Ile Ala Ser
    2375                2380                2385

Thr Gly  Tyr Thr Ile Ile Asn  Gly Lys His Phe Tyr  Phe Asn Thr
    2390                2395                2400

Asp Gly  Ile Met Gln Ile Gly  Val Phe Lys Gly Pro  Asp Gly Phe
    2405                2410                2415

Glu Tyr  Phe Ala Pro Ala Asn  Thr His Asn Asn Asn  Ile Glu Gly
    2420                2425                2430

Gln Ala  Ile Leu Tyr Gln Asn  Lys Phe Leu Thr Leu  Asn Gly Lys
    2435                2440                2445

Lys Tyr  Tyr Phe Gly Ser Asp  Ser Lys Ala Val Thr  Gly Leu Arg
    2450                2455                2460

Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn Thr Asn  Thr Ala Val
    2465                2470                2475

Ala Val  Thr Gly Trp Gln Thr  Ile Asn Gly Lys Lys  Tyr Tyr Phe
    2480                2485                2490
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Asn Thr Asn Thr Tyr Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser
2495 2500 2505

Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly
2510 2515 2520

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2525 2530 2535

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2540 2545 2550

Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asp
2555 2560 2565

Ser Lys Ala Ala Thr Gly Trp Ala Thr Ile Asp Gly Asn Arg Tyr
2570 2575 2580

Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr
2585 2590 2595

Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile
2600 2605 2610

Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala
2615 2620 2625

Asn Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg Tyr Gln
2630 2635 2640

Asn Arg Phe Leu His Leu Leu Gly Asn Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

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Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly
2705 2710

<210> 103
<211> 2710
<212> PRT
<213> Clostridium difficile

<400> 103

Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1 5 10 15

Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
20 25 30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
35 40 45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn
50 55 60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65 70 75 80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
100 105 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
115 120 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
130 135 140

```
Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Thr Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
    290                 295                 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
                325                 330                 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
            340                 345                 350
```

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```
Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
        355                 360                 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
    370                 375                 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385                 390                 395                 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
                405                 410                 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
            420                 425                 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
        435                 440                 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
    450                 455                 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465                 470                 475                 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
                485                 490                 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
            500                 505                 510

Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
        515                 520                 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
    530                 535                 540

Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545                 550                 555                 560
```

```
Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
                565                 570                 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
            580                 585                 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
        595                 600                 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
    610                 615                 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625                 630                 635                 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
                645                 650                 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
            660                 665                 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
        675                 680                 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
    690                 695                 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705                 710                 715                 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser
                725                 730                 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
            740                 745                 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
        755                 760                 765
```

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```
Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
    770                 775                 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785                 790                 795                 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
                805                 810                 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
            820                 825                 830

Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
        835                 840                 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
    850                 855                 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865                 870                 875                 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
                885                 890                 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
            900                 905                 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
        915                 920                 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
    930                 935                 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945                 950                 955                 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
                965                 970                 975
```

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```
Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
            980                 985                 990

Ala Gln Leu Phe Ser Thr Gly Leu  Asn Thr Ile Tyr Asp  Ser Ile Gln
        995                 1000                1005

Leu Val  Asn Leu Ile Ser Asn  Ala Val Asn Asp Thr  Ile Asn Val
    1010                1015                1020

Leu Pro  Thr Ile Thr Glu Gly  Ile Pro Ile Val Ser  Thr Ile Leu
    1025                1030                1035

Asp Gly  Ile Asn Leu Gly Ala  Ala Ile Lys Glu Leu  Leu Asp Glu
    1040                1045                1050

His Asp  Pro Leu Leu Lys Lys  Glu Leu Glu Ala Lys  Val Gly Val
    1055                1060                1065

Leu Ala  Ile Asn Met Ser Leu  Ser Ile Ala Ala Thr  Val Ala Ser
    1070                1075                1080

Ile Val  Gly Ile Gly Ala Glu  Val Thr Ile Phe Leu  Leu Pro Ile
    1085                1090                1095

Ala Gly  Ile Ser Ala Gly Ile  Pro Ser Leu Val Asn  Asn Glu Leu
    1100                1105                1110

Ile Leu  His Asp Lys Ala Thr  Ser Val Val Asn Tyr  Phe Asn His
    1115                1120                1125

Leu Ser  Glu Ser Lys Lys Tyr  Gly Pro Leu Lys Thr  Glu Asp Asp
    1130                1135                1140

Lys Ile  Leu Val Pro Ile Asp  Asp Leu Val Ile Ser  Glu Ile Asp
    1145                1150                1155

Phe Asn  Asn Asn Ser Ile Lys  Leu Gly Thr Cys Asn  Ile Leu Ala
    1160                1165                1170
```

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```
Met Glu  Gly Gly Ser Gly His  Thr Val Thr Gly Asn  Ile Asp His
    1175                1180                1185

Phe Phe  Ser Ser Pro Tyr Ile  Ser Ser His Ile Pro  Ser Leu Ser
    1190                1195                1200

Val Tyr  Ser Ala Ile Gly Ile  Lys Thr Glu Asn Leu  Asp Phe Ser
    1205                1210                1215

Lys Lys  Ile Met Met Leu Pro  Asn Ala Pro Ser Arg  Val Phe Trp
    1220                1225                1230

Trp Glu  Thr Gly Ala Val Pro  Gly Leu Arg Ser Leu  Glu Asn Asp
    1235                1240                1245

Gly Thr  Lys Leu Leu Asp Ser  Ile Arg Asp Leu Tyr  Pro Gly Lys
    1250                1255                1260

Phe Tyr  Trp Arg Phe Tyr Ala  Phe Phe Asp Tyr Ala  Ile Thr Thr
    1265                1270                1275

Leu Lys  Pro Val Tyr Glu Asp  Thr Asn Thr Lys Ile  Lys Leu Asp
    1280                1285                1290

Lys Asp  Thr Arg Asn Phe Ile  Met Pro Thr Ile Thr  Thr Asp Glu
    1295                1300                1305

Ile Arg  Asn Lys Leu Ser Tyr  Ser Phe Asp Gly Ala  Gly Gly Thr
    1310                1315                1320

Tyr Ser  Leu Leu Leu Ser Ser  Tyr Pro Ile Ser Met  Asn Ile Asn
    1325                1330                1335

Leu Ser  Lys Asp Asp Leu Trp  Ile Phe Asn Ile Asp  Asn Glu Val
    1340                1345                1350

Arg Glu  Ile Ser Ile Glu Asn  Gly Thr Ile Lys Lys  Gly Asn Leu
    1355                1360                1365
```

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```
Ile Glu  Asp Val Leu Ser Lys  Ile Asp Ile Asn Lys  Asn Lys Leu
    1370                1375                1380

Ile Ile  Gly Asn Gln Thr Ile  Asp Phe Ser Gly Asp  Ile Asp Asn
    1385                1390                1395

Lys Asp  Arg Tyr Ile Phe Leu  Thr Cys Glu Leu Asp  Asp Lys Ile
    1400                1405                1410

Ser Leu  Ile Ile Glu Ile Asn  Leu Val Ala Lys Ser  Tyr Ser Leu
    1415                1420                1425

Leu Leu  Ser Gly Asp Lys Asn  Tyr Leu Ile Ser Asn  Leu Ser Asn
    1430                1435                1440

Thr Ile  Glu Lys Ile Asn Thr  Leu Gly Leu Asp Ser  Lys Asn Ile
    1445                1450                1455

Ala Tyr  Asn Tyr Thr Asp Glu  Ser Asn Asn Lys Tyr  Phe Gly Ala
    1460                1465                1470

Ile Ser  Lys Thr Ser Gln Lys  Ser Ile Ile His Tyr  Lys Lys Asp
    1475                1480                1485

Ser Lys  Asn Ile Leu Glu Phe  Tyr Asn Gly Ser Thr  Leu Glu Phe
    1490                1495                1500

Asn Ser  Lys Asp Phe Ile Ala  Glu Asp Ile Asn Val  Phe Met Lys
    1505                1510                1515

Asp Asp  Ile Asn Thr Ile Thr  Gly Lys Tyr Tyr Val  Asp Asn Asn
    1520                1525                1530

Thr Asp  Lys Ser Ile Asp Phe  Ser Ile Ser Leu Val  Ser Lys Asn
    1535                1540                1545

Gln Val  Lys Val Asn Gly Leu  Tyr Leu Asn Glu Ser  Val Tyr Ser
    1550                1555                1560
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```
Ser Tyr  Leu Asp Phe Val Lys  Asn Ser Asp Gly His  His Asn Thr
    1565                1570                1575

Ser Asn  Phe Met Asn Leu Phe  Leu Asn Asn Ile Ser  Phe Trp Lys
    1580                1585                1590

Leu Phe  Gly Phe Glu Asn Ile  Asn Phe Val Ile Asp  Lys Tyr Phe
    1595                1600                1605

Thr Leu  Val Gly Lys Thr Asn  Leu Gly Tyr Val Glu  Phe Ile Cys
    1610                1615                1620

Asp Asn  Asn Lys Asn Ile Asp  Ile Tyr Phe Gly Glu  Trp Lys Thr
    1625                1630                1635

Leu Ser  Ser Lys Ser Thr Ile  Phe Ser Gly Asn Gly  Arg Asn Val
    1640                1645                1650

Val Val  Glu Pro Ile Tyr Asn  Pro Asp Thr Gly Glu  Asp Ile Ser
    1655                1660                1665

Thr Ser  Leu Asp Phe Ser Tyr  Glu Pro Leu Tyr Gly  Ile Asp Arg
    1670                1675                1680

Tyr Ile  Asn Lys Val Leu Ile  Ala Pro Asp Leu Tyr  Thr Ser Leu
    1685                1690                1695

Ile Asn  Ile Asn Thr Asn Tyr  Tyr Ser Asn Glu Tyr  Tyr Pro Glu
    1700                1705                1710

Ile Ile  Val Leu Asn Pro Asn  Thr Phe His Lys Lys  Val Asn Ile
    1715                1720                1725

Asn Leu  Asp Ser Ser Ser Phe  Glu Tyr Lys Trp Ser  Thr Glu Gly
    1730                1735                1740

Ser Asp  Phe Ile Leu Val Arg  Tyr Leu Glu Glu Ser  Asn Lys Lys
    1745                1750                1755
```

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```
Ile Leu  Gln Lys Ile Arg Ile  Lys Gly Ile Leu Ser  Asn Thr Gln
    1760                1765                1770

Ser Phe  Asn Lys Met Ser Ile  Asp Phe Lys Asp Ile  Lys Lys Leu
    1775                1780                1785

Ser Leu  Gly Tyr Ile Met Ser  Asn Phe Lys Ser Phe  Asn Ser Glu
    1790                1795                1800

Asn Glu  Leu Asp Arg Asp His  Leu Gly Phe Lys Ile  Ile Asp Asn
    1805                1810                1815

Lys Thr  Tyr Tyr Tyr Asp Glu  Asp Ser Lys Leu Val  Lys Gly Leu
    1820                1825                1830

Ile Asn  Ile Asn Asn Ser Leu  Phe Tyr Phe Asp Pro  Ile Glu Ser
    1835                1840                1845

Asn Leu  Val Thr Gly Trp Gln  Thr Ile Asn Gly Lys  Lys Tyr Tyr
    1850                1855                1860

Phe Asp  Ile Asn Thr Gly Ala  Ala Ser Thr Ser Tyr  Lys Ile Ile
    1865                1870                1875

Asn Gly  Lys His Phe Tyr Phe  Asn Asn Asn Gly Val  Met Gln Leu
    1880                1885                1890

Gly Val  Phe Lys Gly Pro Asp  Gly Phe Glu Tyr Phe  Ala Pro Ala
    1895                1900                1905

Asn Thr  Gln Asn Asn Asn Ile  Glu Gly Gln Ala Ile  Val Tyr Gln
    1910                1915                1920

Ser Lys  Phe Leu Thr Leu Asn  Gly Lys Lys Tyr Tyr  Phe Asp Asn
    1925                1930                1935

Asp Ser  Lys Ala Val Thr Gly  Trp Arg Ile Ile Asn  Asn Glu Lys
    1940                1945                1950
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Tyr Tyr  Phe Asn Pro Asn Asn  Ala Ile Ala Ala Val  Gly Leu Gln
    1955                1960                1965

Val Ile  Asp Asn Asn Lys Tyr  Tyr Phe Asn Pro Asp  Thr Ala Ile
    1970                1975                1980

Ile Ser  Lys Gly Trp Gln Thr  Val Asn Gly Ser Arg  Tyr Tyr Phe
    1985                1990                1995

Asp Thr  Asp Thr Ala Ile Ala  Phe Asn Gly Tyr Lys  Thr Ile Asp
    2000                2005                2010

Gly Lys  His Phe Tyr Phe Asp  Ser Asp Cys Val Val  Lys Ile Gly
    2015                2020                2025

Val Phe  Ser Gly Ser Asn Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2030                2035                2040

Thr Tyr  Asn Asn Asn Ile Glu  Gly Gln Ala Ile Val  Tyr Gln Ser
    2045                2050                2055

Lys Phe  Leu Thr Leu Asn Gly  Lys Lys Tyr Tyr Phe  Asp Asn Asn
    2060                2065                2070

Ser Lys  Ala Val Thr Gly Trp  Gln Thr Ile Asp Ser  Lys Lys Tyr
    2075                2080                2085

Tyr Phe  Asn Thr Asn Thr Ala  Glu Ala Ala Thr Gly  Trp Gln Thr
    2090                2095                2100

Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr Asn Thr  Ala Glu Ala
    2105                2110                2115

Ala Thr  Gly Trp Gln Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn
    2120                2125                2130

Thr Asn  Thr Ser Ile Ala Ser  Thr Gly Tyr Thr Ile  Ile Asn Gly
    2135                2140                2145
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Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2150 2155 2160

Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2165 2170 2175

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Lys
2180 2185 2190

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser
2195 2200 2205

Lys Ala Ile Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Asn Asn Ala Ile Ala Ala Thr His Leu Cys Thr Ile
2225 2230 2235

Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn
2240 2245 2250

Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn
2255 2260 2265

Asn Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly
2270 2275 2280

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu
2285 2290 2295

Gly Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly
2300 2305 2310

Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp
2315 2320 2325

Gln Thr Ile Asp Ser Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala
2330 2335 2340

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Val Ala Val Thr Gly Trp Gln Thr Ile Asp Gly Glu Lys Tyr Tyr
2345 2350 2355

Phe Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2360 2365 2370

Asp Gly Lys Arg Tyr Tyr Phe Asn Thr Asn Thr Tyr Ile Ala Ser
2375 2380 2385

Thr Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr Phe Asn Thr
2390 2395 2400

Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly Phe
2405 2410 2415

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2420 2425 2430

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2435 2440 2445

Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg
2450 2455 2460

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val
2465 2470 2475

Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
2480 2485 2490

Asn Thr Asn Thr Tyr Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser
2495 2500 2505

Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly
2510 2515 2520

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2525 2530 2535

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Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2540 2545 2550

Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asp
2555 2560 2565

Ser Lys Ala Ala Thr Gly Trp Ala Thr Ile Asp Gly Asn Arg Tyr
2570 2575 2580

Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr
2585 2590 2595

Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile
2600 2605 2610

Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala
2615 2620 2625

Asn Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg Tyr Gln
2630 2635 2640

Asn Arg Phe Leu His Leu Leu Gly Asn Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly
2705 2710

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<212> PRT
<213> Clostridium difficile

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<400> 104

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Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
            20                  25                  30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
        35                  40                  45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn
    50                  55                  60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65                  70                  75                  80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
            100                 105                 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
        115                 120                 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
    130                 135                 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Thr Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
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        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
    290                 295                 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
                325                 330                 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
            340                 345                 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
        355                 360                 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
    370                 375                 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385                 390                 395                 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
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405 410 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
420 425 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
435 440 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
450 455 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465 470 475 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
485 490 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
500 505 510

Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
515 520 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
530 535 540

Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545 550 555 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
565 570 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
580 585 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
595 600 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser

610 615 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625 630 635 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
645 650 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
660 665 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
675 680 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
690 695 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705 710 715 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser
725 730 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
740 745 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
755 760 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
770 775 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785 790 795 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
805 810 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser

820 825 830

Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
835 840 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
850 855 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865 870 875 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
885 890 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
900 905 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
915 920 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
930 935 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945 950 955 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
965 970 975

Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
980 985 990

Ala Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln
995 1000 1005

Leu Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val
1010 1015 1020

Leu Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu

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1025 1030 1035

Asp Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu
1040 1045 1050

His Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val
1055 1060 1065

Leu Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser
1070 1075 1080

Ile Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile
1085 1090 1095

Ala Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu
1100 1105 1110

Ile Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His
1115 1120 1125

Leu Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp
1130 1135 1140

Lys Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp
1145 1150 1155

Phe Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala
1160 1165 1170

Met Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His
1175 1180 1185

Phe Phe Ser Ser Pro Tyr Ile Ser Ser His Ile Pro Ser Leu Ser
1190 1195 1200

Val Tyr Ser Ala Ile Gly Ile Lys Thr Glu Asn Leu Asp Phe Ser
1205 1210 1215

Lys Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp

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1220 1225 1230

Trp Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp
1235 1240 1245

Gly Thr Lys Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys
1250 1255 1260

Phe Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr
1265 1270 1275

Leu Lys Pro Val Tyr Glu Asp Thr Asn Thr Lys Ile Lys Leu Asp
1280 1285 1290

Lys Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asp Glu
1295 1300 1305

Ile Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr
1310 1315 1320

Tyr Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Met Asn Ile Asn
1325 1330 1335

Leu Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val
1340 1345 1350

Arg Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Asn Leu
1355 1360 1365

Ile Glu Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu
1370 1375 1380

Ile Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn
1385 1390 1395

Lys Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile
1400 1405 1410

Ser Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu

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1415 1420 1425

Leu Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn
1430 1435 1440

Thr Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile
1445 1450 1455

Ala Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala
1460 1465 1470

Ile Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp
1475 1480 1485

Ser Lys Asn Ile Leu Glu Phe Tyr Asn Gly Ser Thr Leu Glu Phe
1490 1495 1500

Asn Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys
1505 1510 1515

Asp Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn
1520 1525 1530

Thr Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn
1535 1540 1545

Gln Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser
1550 1555 1560

Ser Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr
1565 1570 1575

Ser Asn Phe Met Asn Leu Phe Leu Asn Asn Ile Ser Phe Trp Lys
1580 1585 1590

Leu Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe
1595 1600 1605

Thr Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys

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1610 1615 1620

Asp Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr
1625 1630 1635

Leu Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val
1640 1645 1650

Val Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser
1655 1660 1665

Thr Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg
1670 1675 1680

Tyr Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu
1685 1690 1695

Ile Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu
1700 1705 1710

Ile Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile
1715 1720 1725

Asn Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly
1730 1735 1740

Ser Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys
1745 1750 1755

Ile Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln
1760 1765 1770

Ser Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu
1775 1780 1785

Ser Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu
1790 1795 1800

Asn Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn

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1805 1810 1815

Lys Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu
1820 1825 1830

Ile Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Ser
1835 1840 1845

Asn Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr
1850 1855 1860

Phe Asp Ile Asn Thr Gly Ala Ala Ser Thr Ser Tyr Lys Ile Ile
1865 1870 1875

Asn Gly Lys His Phe Tyr Phe Asn Asn Asn Gly Val Met Gln Leu
1880 1885 1890

Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala
1895 1900 1905

Asn Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln
1910 1915 1920

Ser Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn
1925 1930 1935

Asp Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys
1940 1945 1950

Tyr Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln
1955 1960 1965

Val Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile
1970 1975 1980

Ile Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe
1985 1990 1995

Asp Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp

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2000 2005 2010

Gly Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly
2015 2020 2025

Val Phe Ser Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2030 2035 2040

Thr Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
2045 2050 2055

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
2060 2065 2070

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr
2075 2080 2085

Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr
2090 2095 2100

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala
2105 2110 2115

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2120 2125 2130

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
2135 2140 2145

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2150 2155 2160

Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2165 2170 2175

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Lys
2180 2185 2190

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser

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2195 2200 2205

Lys Ala Ile Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Asn Asn Ala Ile Ala Ala Thr His Leu Cys Thr Ile
2225 2230 2235

Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn
2240 2245 2250

Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn
2255 2260 2265

Asn Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly
2270 2275 2280

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu
2285 2290 2295

Gly Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly
2300 2305 2310

Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp
2315 2320 2325

Gln Thr Ile Asp Ser Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala
2330 2335 2340

Val Ala Val Thr Gly Trp Gln Thr Ile Asp Gly Glu Lys Tyr Tyr
2345 2350 2355

Phe Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2360 2365 2370

Asp Gly Lys Arg Tyr Tyr Phe Asn Thr Asn Thr Tyr Ile Ala Ser
2375 2380 2385

Thr Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr Phe Asn Thr

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2390 2395 2400

Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly Phe
2405 2410 2415

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2420 2425 2430

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2435 2440 2445

Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg
2450 2455 2460

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val
2465 2470 2475

Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
2480 2485 2490

Asn Thr Asn Thr Tyr Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser
2495 2500 2505

Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly
2510 2515 2520

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2525 2530 2535

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2540 2545 2550

Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asp
2555 2560 2565

Ser Lys Ala Ala Thr Gly Trp Ala Thr Ile Asp Gly Asn Arg Tyr
2570 2575 2580

Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr

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2585 2590 2595

Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile
2600 2605 2610

Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala
2615 2620 2625

Asn Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg Tyr Gln
2630 2635 2640

Asn Arg Phe Leu His Leu Leu Gly Asn Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly
2705 2710

<210> 105
<211> 2710
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<400> 105

Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1 5 10 15

Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
20 25 30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
35 40 45

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Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr
    50                  55                  60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65                  70                  75                  80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
            100                 105                 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
        115                 120                 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
    130                 135                 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255
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Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
    290                 295                 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
                325                 330                 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
            340                 345                 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
        355                 360                 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
    370                 375                 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385                 390                 395                 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
                405                 410                 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
            420                 425                 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
        435                 440                 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
    450                 455                 460
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Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465                 470                 475                 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
                485                 490                 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
            500                 505                 510

Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
        515                 520                 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
    530                 535                 540

Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545                 550                 555                 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
                565                 570                 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
            580                 585                 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
        595                 600                 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
    610                 615                 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625                 630                 635                 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
                645                 650                 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
            660                 665                 670
```

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```
Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
        675                 680                 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
    690                 695                 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705                 710                 715                 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser
                725                 730                 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
            740                 745                 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
        755                 760                 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
    770                 775                 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785                 790                 795                 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
                805                 810                 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
            820                 825                 830

Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
        835                 840                 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
    850                 855                 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865                 870                 875                 880
```

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```
Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
                885                 890                 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
            900                 905                 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
        915                 920                 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
    930                 935                 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945                 950                 955                 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
                965                 970                 975

Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
            980                 985                 990

Ala Gln Leu Phe Ser Thr Gly Leu  Asn Thr Ile Tyr Asp  Ser Ile Gln
        995                 1000                1005

Leu Val  Asn Leu Ile Ser Asn  Ala Val Asn Asp Thr  Ile Asn Val
    1010                1015                1020

Leu Pro  Thr Ile Thr Glu Gly  Ile Pro Ile Val Ser  Thr Ile Leu
    1025                1030                1035

Asp Gly  Ile Asn Leu Gly Ala  Ala Ile Lys Glu Leu  Leu Asp Glu
    1040                1045                1050

His Asp  Pro Leu Leu Lys Lys  Glu Leu Glu Ala Lys  Val Gly Val
    1055                1060                1065

Leu Ala  Ile Asn Met Ser Leu  Ser Ile Ala Ala Thr  Val Ala Ser
    1070                1075                1080
```

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```
Ile Val  Gly Ile Gly Ala Glu  Val Thr Ile Phe Leu  Leu Pro Ile
    1085                1090                1095

Ala Gly  Ile Ser Ala Gly Ile  Pro Ser Leu Val Asn  Asn Glu Leu
    1100                1105                1110

Ile Leu  His Asp Lys Ala Thr  Ser Val Val Asn Tyr  Phe Asn His
    1115                1120                1125

Leu Ser  Glu Ser Lys Lys Tyr  Gly Pro Leu Lys Thr  Glu Asp Asp
    1130                1135                1140

Lys Ile  Leu Val Pro Ile Asp  Asp Leu Val Ile Ser  Glu Ile Asp
    1145                1150                1155

Phe Asn  Asn Asn Ser Ile Lys  Leu Gly Thr Cys Asn  Ile Leu Ala
    1160                1165                1170

Met Glu  Gly Gly Ser Gly His  Thr Val Thr Gly Asn  Ile Asp His
    1175                1180                1185

Phe Phe  Ser Ser Pro Ser Ile  Ser Ser His Ile Pro  Ser Leu Ser
    1190                1195                1200

Ile Tyr  Ser Ala Ile Gly Ile  Glu Thr Glu Asn Leu  Asp Phe Ser
    1205                1210                1215

Lys Lys  Ile Met Met Leu Pro  Asn Ala Pro Ser Arg  Val Phe Trp
    1220                1225                1230

Trp Glu  Thr Gly Ala Val Pro  Gly Leu Arg Ser Leu  Glu Asn Asp
    1235                1240                1245

Gly Thr  Arg Leu Leu Asp Ser  Ile Arg Asp Leu Tyr  Pro Gly Lys
    1250                1255                1260

Phe Tyr  Trp Arg Phe Tyr Ala  Phe Phe Asp Tyr Ala  Ile Thr Thr
    1265                1270                1275
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Leu Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp
1280 1285 1290

Lys Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu
1295 1300 1305

Ile Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr
1310 1315 1320

Tyr Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn
1325 1330 1335

Leu Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val
1340 1345 1350

Arg Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu
1355 1360 1365

Ile Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu
1370 1375 1380

Ile Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn
1385 1390 1395

Lys Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile
1400 1405 1410

Ser Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu
1415 1420 1425

Leu Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn
1430 1435 1440

Thr Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile
1445 1450 1455

Ala Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala
1460 1465 1470

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```
Ile Ser  Lys Thr Ser Gln Lys  Ser Ile Ile His Tyr  Lys Lys Asp
    1475                1480                1485

Ser Lys  Asn Ile Leu Glu Phe  Tyr Asn Asp Ser Thr  Leu Glu Phe
    1490                1495                1500

Asn Ser  Lys Asp Phe Ile Ala  Glu Asp Ile Asn Val  Phe Met Lys
    1505                1510                1515

Asp Asp  Ile Asn Thr Ile Thr  Gly Lys Tyr Tyr Val  Asp Asn Asn
    1520                1525                1530

Thr Asp  Lys Ser Ile Asp Phe  Ser Ile Ser Leu Val  Ser Lys Asn
    1535                1540                1545

Gln Val  Lys Val Asn Gly Leu  Tyr Leu Asn Glu Ser  Val Tyr Ser
    1550                1555                1560

Ser Tyr  Leu Asp Phe Val Lys  Asn Ser Asp Gly His  His Asn Thr
    1565                1570                1575

Ser Asn  Phe Met Asn Leu Phe  Leu Asp Asn Ile Ser  Phe Trp Lys
    1580                1585                1590

Leu Phe  Gly Phe Glu Asn Ile  Asn Phe Val Ile Asp  Lys Tyr Phe
    1595                1600                1605

Thr Leu  Val Gly Lys Thr Asn  Leu Gly Tyr Val Glu  Phe Ile Cys
    1610                1615                1620

Asp Asn  Asn Lys Asn Ile Asp  Ile Tyr Phe Gly Glu  Trp Lys Thr
    1625                1630                1635

Ser Ser  Ser Lys Ser Thr Ile  Phe Ser Gly Asn Gly  Arg Asn Val
    1640                1645                1650

Val Val  Glu Pro Ile Tyr Asn  Pro Asp Thr Gly Glu  Asp Ile Ser
    1655                1660                1665
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Thr Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg
1670 1675 1680

Tyr Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu
1685 1690 1695

Ile Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu
1700 1705 1710

Ile Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile
1715 1720 1725

Asn Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly
1730 1735 1740

Ser Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys
1745 1750 1755

Ile Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln
1760 1765 1770

Ser Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu
1775 1780 1785

Ser Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu
1790 1795 1800

Asn Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn
1805 1810 1815

Lys Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu
1820 1825 1830

Ile Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe
1835 1840 1845

Asn Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr
1850 1855 1860

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```
Phe Asp  Ile Asn Thr Gly Ala  Ala Leu Thr Ser Tyr  Lys Ile Ile
    1865                1870                1875

Asn Gly  Lys His Phe Tyr Phe  Asn Asn Asp Gly Val  Met Gln Leu
    1880                1885                1890

Gly Val  Phe Lys Gly Pro Asp  Gly Phe Glu Tyr Phe  Ala Pro Ala
    1895                1900                1905

Asn Thr  Gln Asn Asn Asn Ile  Glu Gly Gln Ala Ile  Val Tyr Gln
    1910                1915                1920

Ser Lys  Phe Leu Thr Leu Asn  Gly Lys Lys Tyr Tyr  Phe Asp Asn
    1925                1930                1935

Asp Ser  Lys Ala Val Thr Gly  Trp Arg Ile Ile Asn  Asn Glu Lys
    1940                1945                1950

Tyr Tyr  Phe Asn Pro Asn Asn  Ala Ile Ala Ala Val  Gly Leu Gln
    1955                1960                1965

Val Ile  Asp Asn Asn Lys Tyr  Tyr Phe Asn Pro Asp  Thr Ala Ile
    1970                1975                1980

Ile Ser  Lys Gly Trp Gln Thr  Val Asn Gly Ser Arg  Tyr Tyr Phe
    1985                1990                1995

Asp Thr  Asp Thr Ala Ile Ala  Phe Asn Gly Tyr Lys  Thr Ile Asp
    2000                2005                2010

Gly Lys  His Phe Tyr Phe Asp  Ser Asp Cys Val Val  Lys Ile Gly
    2015                2020                2025

Val Phe  Ser Thr Ser Asn Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2030                2035                2040

Thr Tyr  Asn Asn Asn Ile Glu  Gly Gln Ala Ile Val  Tyr Gln Ser
    2045                2050                2055
```

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```
Lys Phe  Leu Thr Leu Asn Gly  Lys Lys Tyr Tyr Phe  Asp Asn Asn
    2060                 2065                 2070

Ser Lys  Ala Val Thr Gly Trp  Gln Thr Ile Asp Ser  Lys Lys Tyr
    2075                 2080                 2085

Tyr Phe  Asn Thr Asn Thr Ala  Glu Ala Ala Thr Gly  Trp Gln Thr
    2090                 2095                 2100

Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr Asn Thr  Ala Glu Ala
    2105                 2110                 2115

Ala Thr  Gly Trp Gln Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn
    2120                 2125                 2130

Thr Asn  Thr Ala Ile Ala Ser  Thr Gly Tyr Thr Ile  Ile Asn Gly
    2135                 2140                 2145

Lys His  Phe Tyr Phe Asn Thr  Asp Gly Ile Met Gln  Ile Gly Val
    2150                 2155                 2160

Phe Lys  Gly Pro Asn Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr
    2165                 2170                 2175

Asp Ala  Asn Asn Ile Glu Gly  Gln Ala Ile Leu Tyr  Gln Asn Glu
    2180                 2185                 2190

Phe Leu  Thr Leu Asn Gly Lys  Lys Tyr Tyr Phe Gly  Ser Asp Ser
    2195                 2200                 2205

Lys Ala  Val Thr Gly Trp Arg  Ile Ile Asn Asn Lys  Lys Tyr Tyr
    2210                 2215                 2220

Phe Asn  Pro Asn Asn Ala Ile  Ala Ala Ile His Leu  Cys Thr Ile
    2225                 2230                 2235

Asn Asn  Asp Lys Tyr Tyr Phe  Ser Tyr Asp Gly Ile  Leu Gln Asn
    2240                 2245                 2250
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Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn
2255 2260 2265

Asn Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly
2270 2275 2280

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu
2285 2290 2295

Gly Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly
2300 2305 2310

Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp
2315 2320 2325

Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala
2330 2335 2340

Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr
2345 2350 2355

Phe Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2360 2365 2370

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser
2375 2380 2385

Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr
2390 2395 2400

Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe
2405 2410 2415

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2420 2425 2430

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2435 2440 2445

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```
Lys Tyr  Tyr Phe Gly Ser Asp  Ser Lys Ala Val Thr  Gly Leu Arg
    2450                 2455                 2460

Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn Thr Asn  Thr Ala Val
    2465                 2470                 2475

Ala Val  Thr Gly Trp Gln Thr  Ile Asn Gly Lys Lys  Tyr Tyr Phe
    2480                 2485                 2490

Asn Thr  Asn Thr Ser Ile Ala  Ser Thr Gly Tyr Thr  Ile Ile Ser
    2495                 2500                 2505

Gly Lys  His Phe Tyr Phe Asn  Thr Asp Gly Ile Met  Gln Ile Gly
    2510                 2515                 2520

Val Phe  Lys Gly Pro Asp Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2525                 2530                 2535

Thr Asp  Ala Asn Asn Ile Glu  Gly Gln Ala Ile Arg  Tyr Gln Asn
    2540                 2545                 2550

Arg Phe  Leu Tyr Leu His Asp  Asn Ile Tyr Tyr Phe  Gly Asn Asn
    2555                 2560                 2565

Ser Lys  Ala Ala Thr Gly Trp  Val Thr Ile Asp Gly  Asn Arg Tyr
    2570                 2575                 2580

Tyr Phe  Glu Pro Asn Thr Ala  Met Gly Ala Asn Gly  Tyr Lys Thr
    2585                 2590                 2595

Ile Asp  Asn Lys Asn Phe Tyr  Phe Arg Asn Gly Leu  Pro Gln Ile
    2600                 2605                 2610

Gly Val  Phe Lys Gly Ser Asn  Gly Phe Glu Tyr Phe  Ala Pro Ala
    2615                 2620                 2625

Asn Thr  Asp Ala Asn Asn Ile  Glu Gly Gln Ala Ile  Arg Tyr Gln
    2630                 2635                 2640
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Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly
2705 2710

<210> 106
<211> 2710
<212> PRT
<213> Clostridium difficile

<400> 106

Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1 5 10 15

Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
20 25 30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
35 40 45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr
50 55 60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65 70 75 80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
85 90 95

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```
Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
            100                 105                 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
        115                 120                 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
    130                 135                 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
    290                 295                 300
```

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```
Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
                325                 330                 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
            340                 345                 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
        355                 360                 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
    370                 375                 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385                 390                 395                 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
                405                 410                 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
            420                 425                 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
        435                 440                 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
    450                 455                 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465                 470                 475                 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
                485                 490                 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
            500                 505                 510
```

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```
Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
        515                 520                 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
    530                 535                 540

Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545                 550                 555                 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
                565                 570                 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
            580                 585                 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
        595                 600                 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
    610                 615                 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625                 630                 635                 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
                645                 650                 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
            660                 665                 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
        675                 680                 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
    690                 695                 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705                 710                 715                 720
```

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```
Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser
                725                 730                 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
            740                 745                 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
        755                 760                 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
    770                 775                 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785                 790                 795                 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
                805                 810                 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
            820                 825                 830

Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
        835                 840                 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
    850                 855                 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865                 870                 875                 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
                885                 890                 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
            900                 905                 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
        915                 920                 925
```

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```
Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
    930                 935                 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945                 950                 955                 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
                965                 970                 975

Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
            980                 985                 990

Ala Gln Leu Phe Ser Thr Gly Leu  Asn Thr Ile Tyr Asp  Ser Ile Gln
        995                 1000                1005

Leu Val  Asn Leu Ile Ser Asn  Ala Val Asn Asp Thr  Ile Asn Val
    1010                1015                1020

Leu Pro  Thr Ile Thr Glu Gly  Ile Pro Ile Val Ser  Thr Ile Leu
    1025                1030                1035

Asp Gly  Ile Asn Leu Gly Ala  Ala Ile Lys Glu Leu  Leu Asp Glu
    1040                1045                1050

His Asp  Pro Leu Leu Lys Lys  Glu Leu Glu Ala Lys  Val Gly Val
    1055                1060                1065

Leu Ala  Ile Asn Met Ser Leu  Ser Ile Ala Ala Thr  Val Ala Ser
    1070                1075                1080

Ile Val  Gly Ile Gly Ala Glu  Val Thr Ile Phe Leu  Leu Pro Ile
    1085                1090                1095

Ala Gly  Ile Ser Ala Gly Ile  Pro Ser Leu Val Asn  Asn Glu Leu
    1100                1105                1110

Ile Leu  His Asp Lys Ala Thr  Ser Val Val Asn Tyr  Phe Asn His
    1115                1120                1125
```

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Leu Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp
1130 1135 1140

Lys Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp
1145 1150 1155

Phe Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala
1160 1165 1170

Met Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His
1175 1180 1185

Phe Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser
1190 1195 1200

Ile Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser
1205 1210 1215

Lys Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp
1220 1225 1230

Trp Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp
1235 1240 1245

Gly Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys
1250 1255 1260

Phe Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr
1265 1270 1275

Leu Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp
1280 1285 1290

Lys Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu
1295 1300 1305

Ile Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr
1310 1315 1320

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```
Tyr Ser  Leu Leu Leu Ser Ser  Tyr Pro Ile Ser Thr  Asn Ile Asn
    1325                1330                1335

Leu Ser  Lys Asp Asp Leu Trp  Ile Phe Asn Ile Asp  Asn Glu Val
    1340                1345                1350

Arg Glu  Ile Ser Ile Glu Asn  Gly Thr Ile Lys Lys  Gly Lys Leu
    1355                1360                1365

Ile Lys  Asp Val Leu Ser Lys  Ile Asp Ile Asn Lys  Asn Lys Leu
    1370                1375                1380

Ile Ile  Gly Asn Gln Thr Ile  Asp Phe Ser Gly Asp  Ile Asp Asn
    1385                1390                1395

Lys Asp  Arg Tyr Ile Phe Leu  Thr Cys Glu Leu Asp  Asp Lys Ile
    1400                1405                1410

Ser Leu  Ile Ile Glu Ile Asn  Leu Val Ala Lys Ser  Tyr Ser Leu
    1415                1420                1425

Leu Leu  Ser Gly Asp Lys Asn  Tyr Leu Ile Ser Asn  Leu Ser Asn
    1430                1435                1440

Thr Ile  Glu Lys Ile Asn Thr  Leu Gly Leu Asp Ser  Lys Asn Ile
    1445                1450                1455

Ala Tyr  Asn Tyr Thr Asp Glu  Ser Asn Asn Lys Tyr  Phe Gly Ala
    1460                1465                1470

Ile Ser  Lys Thr Ser Gln Lys  Ser Ile Ile His Tyr  Lys Lys Asp
    1475                1480                1485

Ser Lys  Asn Ile Leu Glu Phe  Tyr Asn Asp Ser Thr  Leu Glu Phe
    1490                1495                1500

Asn Ser  Lys Asp Phe Ile Ala  Glu Asp Ile Asn Val  Phe Met Lys
    1505                1510                1515
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Asp Asp Val Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn
1520 1525 1530

Thr Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn
1535 1540 1545

Gln Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser
1550 1555 1560

Ser Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr
1565 1570 1575

Ser Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys
1580 1585 1590

Leu Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe
1595 1600 1605

Thr Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys
1610 1615 1620

Asp Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr
1625 1630 1635

Ser Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val
1640 1645 1650

Val Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser
1655 1660 1665

Thr Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg
1670 1675 1680

Tyr Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu
1685 1690 1695

Ile Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu
1700 1705 1710

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```
Ile Ile  Val Leu Asn Pro Asn  Thr Phe His Lys Lys  Val Asn Ile
    1715                1720                1725

Asn Leu  Asp Ser Ser Ser Phe  Glu Tyr Lys Trp Ser  Thr Glu Gly
    1730                1735                1740

Ser Asp  Phe Ile Leu Val Arg  Tyr Leu Glu Glu Ser  Asn Lys Lys
    1745                1750                1755

Ile Leu  Gln Lys Ile Arg Ile  Lys Gly Ile Leu Ser  Asn Thr Gln
    1760                1765                1770

Ser Phe  Asn Lys Met Ser Ile  Asp Phe Lys Asp Ile  Lys Lys Leu
    1775                1780                1785

Ser Leu  Gly Tyr Ile Met Ser  Asn Phe Lys Ser Phe  Asn Ser Glu
    1790                1795                1800

Asn Glu  Leu Asp Arg Asp His  Leu Gly Phe Lys Ile  Ile Asp Asn
    1805                1810                1815

Lys Thr  Tyr Tyr Tyr Asp Glu  Asp Ser Lys Leu Val  Lys Gly Leu
    1820                1825                1830

Ile Asn  Ile Asn Asn Ser Leu  Phe Tyr Phe Asp Pro  Ile Glu Phe
    1835                1840                1845

Asn Leu  Val Thr Gly Trp Gln  Thr Ile Asn Gly Lys  Lys Tyr Tyr
    1850                1855                1860

Phe Asp  Ile Asn Thr Gly Ala  Ala Leu Thr Ser Tyr  Lys Ile Ile
    1865                1870                1875

Asn Gly  Lys His Phe Tyr Phe  Asn Asn Asp Gly Val  Met Gln Leu
    1880                1885                1890

Gly Val  Phe Lys Gly Pro Asp  Gly Phe Glu Tyr Phe  Ala Pro Ala
    1895                1900                1905
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Asn Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln
1910 1915 1920

Ser Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn
1925 1930 1935

Asn Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys
1940 1945 1950

Tyr Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln
1955 1960 1965

Val Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile
1970 1975 1980

Ile Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe
1985 1990 1995

Asp Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp
2000 2005 2010

Gly Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly
2015 2020 2025

Val Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2030 2035 2040

Thr Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
2045 2050 2055

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
2060 2065 2070

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr
2075 2080 2085

Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr
2090 2095 2100

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Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala
2105 2110 2115

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2120 2125 2130

Thr Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
2135 2140 2145

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2150 2155 2160

Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2165 2170 2175

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu
2180 2185 2190

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser
2195 2200 2205

Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile
2225 2230 2235

Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn
2240 2245 2250

Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn
2255 2260 2265

Asn Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly
2270 2275 2280

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu
2285 2290 2295

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Gly Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly
2300 2305 2310

Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp
2315 2320 2325

Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala
2330 2335 2340

Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr
2345 2350 2355

Phe Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2360 2365 2370

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser
2375 2380 2385

Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr
2390 2395 2400

Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe
2405 2410 2415

Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly
2420 2425 2430

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2435 2440 2445

Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg
2450 2455 2460

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val
2465 2470 2475

Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
2480 2485 2490

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Asn Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser
2495 2500 2505

Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly
2510 2515 2520

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2525 2530 2535

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2540 2545 2550

Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn
2555 2560 2565

Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr
2570 2575 2580

Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr
2585 2590 2595

Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile
2600 2605 2610

Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala
2615 2620 2625

Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln
2630 2635 2640

Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

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Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly
2705 2710

<210> 107
<211> 2710
<212> PRT
<213> Clostridium difficile

<400> 107

Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1 5 10 15

Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
20 25 30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
35 40 45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr
50 55 60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65 70 75 80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
100 105 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
115 120 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
130 135 140

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```
Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
    290                 295                 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
                325                 330                 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
            340                 345                 350
```

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```
Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
        355                 360                 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
    370                 375                 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385                 390                 395                 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
                405                 410                 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
            420                 425                 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
        435                 440                 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
    450                 455                 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465                 470                 475                 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
                485                 490                 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
            500                 505                 510

Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
        515                 520                 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
    530                 535                 540

Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545                 550                 555                 560
```

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```
Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
                565                 570                 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
            580                 585                 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
        595                 600                 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
    610                 615                 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625                 630                 635                 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
                645                 650                 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
            660                 665                 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
        675                 680                 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
    690                 695                 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705                 710                 715                 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser
                725                 730                 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
            740                 745                 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
        755                 760                 765
```

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```
Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
    770                 775                 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785                 790                 795                 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
                805                 810                 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
            820                 825                 830

Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
        835                 840                 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
    850                 855                 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865                 870                 875                 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
                885                 890                 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
            900                 905                 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
        915                 920                 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
    930                 935                 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945                 950                 955                 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
                965                 970                 975
```

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```
Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
            980                 985                 990

Ala Gln Leu Phe Ser Thr Gly Leu  Asn Thr Ile Tyr Asp  Ser Ile Gln
        995                 1000                1005

Leu Val  Asn Leu Ile Ser Asn  Ala Val Asn Asp Thr  Ile Asn Val
    1010                1015                1020

Leu Pro  Thr Ile Thr Glu Gly  Ile Pro Ile Val Ser  Thr Ile Leu
    1025                1030                1035

Asp Gly  Ile Asn Leu Gly Ala  Ala Ile Lys Glu Leu  Leu Asp Glu
    1040                1045                1050

His Asp  Pro Leu Leu Lys Lys  Glu Leu Glu Ala Lys  Val Gly Val
    1055                1060                1065

Leu Ala  Ile Asn Met Ser Leu  Ser Ile Ala Ala Thr  Val Ala Ser
    1070                1075                1080

Ile Val  Gly Ile Gly Ala Glu  Val Thr Ile Phe Leu  Leu Pro Ile
    1085                1090                1095

Ala Gly  Ile Ser Ala Gly Ile  Pro Ser Leu Val Asn  Asn Glu Leu
    1100                1105                1110

Ile Leu  His Asp Lys Ala Thr  Ser Val Val Asn Tyr  Phe Asn His
    1115                1120                1125

Leu Ser  Glu Ser Lys Lys Tyr  Gly Pro Leu Lys Thr  Glu Asp Asp
    1130                1135                1140

Lys Ile  Leu Val Pro Ile Asp  Asp Leu Val Ile Ser  Glu Ile Asp
    1145                1150                1155

Phe Asn  Asn Asn Ser Ile Lys  Leu Gly Thr Cys Asn  Ile Leu Ala
    1160                1165                1170
```

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```
Met Glu  Gly Gly Ser Gly His  Thr Val Thr Gly Asn  Ile Asp His
    1175                1180                1185

Phe Phe  Ser Ser Pro Ser Ile  Ser Ser His Ile Pro  Ser Leu Ser
    1190                1195                1200

Ile Tyr  Ser Ala Ile Gly Ile  Glu Thr Glu Asn Leu  Asp Phe Ser
    1205                1210                1215

Lys Lys  Ile Met Met Leu Pro  Asn Ala Pro Ser Arg  Val Phe Trp
    1220                1225                1230

Trp Glu  Thr Gly Ala Val Pro  Gly Leu Arg Ser Leu  Glu Asn Asp
    1235                1240                1245

Gly Thr  Arg Leu Leu Asp Ser  Ile Arg Asp Leu Tyr  Pro Gly Lys
    1250                1255                1260

Phe Tyr  Trp Arg Phe Tyr Ala  Phe Phe Asp Tyr Ala  Ile Thr Thr
    1265                1270                1275

Leu Lys  Pro Val Tyr Glu Asp  Thr Asn Ile Lys Ile  Lys Leu Asp
    1280                1285                1290

Lys Asp  Thr Arg Asn Phe Ile  Met Pro Thr Ile Thr  Thr Asn Glu
    1295                1300                1305

Ile Arg  Asn Lys Leu Ser Tyr  Ser Phe Asp Gly Ala  Gly Gly Thr
    1310                1315                1320

Tyr Ser  Leu Leu Leu Ser Ser  Tyr Pro Ile Ser Thr  Asn Ile Asn
    1325                1330                1335

Leu Ser  Lys Asp Asp Leu Trp  Ile Phe Asn Ile Asp  Asn Glu Val
    1340                1345                1350

Arg Glu  Ile Ser Ile Glu Asn  Gly Thr Ile Lys Lys  Gly Lys Leu
    1355                1360                1365
```

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```
Ile Lys  Asp Val Leu Ser Lys  Ile Asp Ile Asn Lys  Asn Lys Leu
    1370                1375                1380

Ile Ile  Gly Asn Gln Thr Ile  Asp Phe Ser Gly Asp  Ile Asp Asn
    1385                1390                1395

Lys Asp  Arg Tyr Ile Phe Leu  Thr Cys Glu Leu Asp  Asp Lys Ile
    1400                1405                1410

Ser Leu  Ile Ile Glu Ile Asn  Leu Val Ala Lys Ser  Tyr Ser Leu
    1415                1420                1425

Leu Leu  Ser Gly Asp Lys Asn  Tyr Leu Ile Ser Asn  Leu Ser Asn
    1430                1435                1440

Thr Ile  Glu Lys Ile Asn Thr  Leu Gly Leu Asp Ser  Lys Asn Ile
    1445                1450                1455

Ala Tyr  Asn Tyr Thr Asp Glu  Ser Asn Asn Lys Tyr  Phe Gly Ala
    1460                1465                1470

Ile Ser  Lys Thr Ser Gln Lys  Ser Ile Ile His Tyr  Lys Lys Asp
    1475                1480                1485

Ser Lys  Asn Ile Leu Glu Phe  Tyr Asn Asp Ser Thr  Leu Glu Phe
    1490                1495                1500

Asn Ser  Lys Asp Phe Ile Ala  Glu Asp Ile Asn Val  Phe Met Lys
    1505                1510                1515

Asp Asp  Ile Asn Thr Ile Thr  Gly Lys Tyr Tyr Val  Asp Asn Asn
    1520                1525                1530

Thr Asp  Lys Ser Ile Asp Phe  Ser Ile Ser Leu Val  Ser Lys Asn
    1535                1540                1545

Gln Val  Lys Val Asn Gly Leu  Tyr Leu Asn Glu Ser  Val Tyr Ser
    1550                1555                1560
```

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```
Ser Tyr  Leu Asp Phe Val Lys  Asn Ser Asp Gly His  His Asn Thr
    1565                1570                1575

Ser Asn  Phe Met Asn Leu Phe  Leu Asp Asn Ile Ser  Phe Trp Lys
    1580                1585                1590

Leu Phe  Gly Phe Glu Asn Ile  Asn Phe Val Ile Asp  Lys Tyr Phe
    1595                1600                1605

Thr Leu  Val Gly Lys Thr Asn  Leu Gly Tyr Val Glu  Phe Ile Cys
    1610                1615                1620

Asp Asn  Asn Lys Asn Ile Asp  Ile Tyr Phe Gly Glu  Trp Lys Thr
    1625                1630                1635

Ser Ser  Ser Lys Ser Thr Ile  Phe Ser Gly Asn Gly  Arg Asn Val
    1640                1645                1650

Val Val  Glu Pro Ile Tyr Asn  Pro Asp Thr Gly Glu  Asp Ile Ser
    1655                1660                1665

Thr Ser  Leu Asp Phe Ser Tyr  Glu Pro Leu Tyr Gly  Ile Asp Arg
    1670                1675                1680

Tyr Ile  Asn Lys Val Leu Ile  Ala Pro Asp Leu Tyr  Thr Ser Leu
    1685                1690                1695

Ile Asn  Ile Asn Thr Asn Tyr  Tyr Ser Asn Glu Tyr  Tyr Pro Glu
    1700                1705                1710

Ile Ile  Val Leu Asn Pro Asn  Thr Phe His Lys Lys  Val Asn Ile
    1715                1720                1725

Asn Leu  Asp Ser Ser Ser Phe  Glu Tyr Lys Trp Ser  Thr Glu Gly
    1730                1735                1740

Ser Asp  Phe Ile Leu Val Arg  Tyr Leu Glu Glu Ser  Asn Lys Lys
    1745                1750                1755
```

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```
Ile Leu  Gln Lys Ile Arg Ile  Lys Gly Ile Leu Ser  Asn Thr Gln
    1760                1765                1770

Ser Phe  Asn Lys Met Ser Ile  Asp Phe Lys Asp Ile  Lys Lys Leu
    1775                1780                1785

Ser Leu  Gly Tyr Ile Met Ser  Asn Phe Lys Ser Phe  Asn Ser Glu
    1790                1795                1800

Asn Glu  Leu Asp Arg Asp His  Leu Gly Phe Lys Ile  Ile Asp Asn
    1805                1810                1815

Lys Thr  Tyr Tyr Tyr Asp Glu  Asp Ser Lys Leu Val  Lys Gly Leu
    1820                1825                1830

Ile Asn  Ile Asn Asn Ser Leu  Phe Tyr Phe Asp Pro  Ile Glu Phe
    1835                1840                1845

Asn Leu  Val Thr Gly Trp Gln  Thr Ile Asn Gly Lys  Lys Tyr Tyr
    1850                1855                1860

Phe Asp  Ile Asn Thr Gly Ala  Ala Leu Thr Ser Tyr  Lys Ile Ile
    1865                1870                1875

Asn Gly  Lys His Phe Tyr Phe  Asn Asn Asp Gly Val  Met Gln Leu
    1880                1885                1890

Gly Val  Phe Lys Gly Pro Asp  Gly Phe Glu Tyr Phe  Ala Pro Ala
    1895                1900                1905

Asn Thr  Gln Asn Asn Asn Ile  Glu Gly Gln Ala Ile  Val Tyr Gln
    1910                1915                1920

Ser Lys  Phe Leu Thr Leu Asn  Gly Lys Lys Tyr Tyr  Phe Asp Asn
    1925                1930                1935

Asp Ser  Lys Ala Val Thr Gly  Trp Arg Ile Ile Asn  Asn Glu Lys
    1940                1945                1950
```

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Tyr Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln
1955 1960 1965

Val Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile
1970 1975 1980

Ile Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe
1985 1990 1995

Asp Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp
2000 2005 2010

Gly Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly
2015 2020 2025

Val Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2030 2035 2040

Thr Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
2045 2050 2055

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
2060 2065 2070

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr
2075 2080 2085

Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr
2090 2095 2100

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala
2105 2110 2115

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2120 2125 2130

Thr Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
2135 2140 2145

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Lys His  Phe Tyr Phe Asn Thr  Asp Gly Ile Met Gln  Ile Gly Val
    2150                2155                2160

Phe Lys  Gly Pro Asn Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr
    2165                2170                2175

Asp Ala  Asn Asn Ile Glu Gly  Gln Ala Ile Leu Tyr  Gln Asn Glu
    2180                2185                2190

Phe Leu  Thr Leu Asn Gly Lys  Lys Tyr Tyr Phe Gly  Ser Asp Ser
    2195                2200                2205

Lys Ala  Val Thr Gly Trp Arg  Ile Ile Asn Asn Lys  Lys Tyr Tyr
    2210                2215                2220

Phe Asn  Pro Asn Asn Ala Ile  Ala Ala Ile His Leu  Cys Thr Ile
    2225                2230                2235

Asn Asn  Asp Lys Tyr Tyr Phe  Ser Tyr Asp Gly Ile  Leu Gln Asn
    2240                2245                2250

Gly Tyr  Ile Thr Ile Glu Arg  Asn Asn Phe Tyr Phe  Asp Ala Asn
    2255                2260                2265

Asn Glu  Ser Lys Met Val Thr  Gly Val Phe Lys Gly  Pro Asn Gly
    2270                2275                2280

Phe Glu  Tyr Phe Ala Pro Ala  Asn Thr His Asn Asn  Asn Ile Glu
    2285                2290                2295

Gly Gln  Ala Ile Val Tyr Gln  Asn Lys Phe Leu Thr  Leu Asn Gly
    2300                2305                2310

Lys Lys  Tyr Tyr Phe Asp Asn  Asp Ser Lys Ala Val  Thr Gly Trp
    2315                2320                2325

Gln Thr  Ile Asp Gly Lys Lys  Tyr Tyr Phe Asn Leu  Asn Thr Ala
    2330                2335                2340
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Glu Ala  Ala Thr Gly Trp Gln  Thr Ile Asp Gly Lys  Lys Tyr Tyr
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Phe Asn  Leu Asn Thr Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile
    2360                2365                2370

Asp Gly  Lys Lys Tyr Tyr Phe  Asn Thr Asn Thr Phe  Ile Ala Ser
    2375                2380                2385

Thr Gly  Tyr Thr Ser Ile Asn  Gly Lys His Phe Tyr  Phe Asn Thr
    2390                2395                2400

Asp Gly  Ile Met Gln Ile Gly  Val Phe Lys Gly Pro  Asn Gly Phe
    2405                2410                2415

Glu Tyr  Phe Ala Pro Ala Asn  Thr Asp Ala Asn Asn  Ile Glu Gly
    2420                2425                2430

Gln Ala  Ile Leu Tyr Gln Asn  Lys Phe Leu Thr Leu  Asn Gly Lys
    2435                2440                2445

Lys Tyr  Tyr Phe Gly Ser Asp  Ser Lys Ala Val Thr  Gly Leu Arg
    2450                2455                2460

Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn Thr Asn  Thr Ala Val
    2465                2470                2475

Ala Val  Thr Gly Trp Gln Thr  Ile Asn Gly Lys Lys  Tyr Tyr Phe
    2480                2485                2490

Asn Thr  Asn Thr Ser Ile Ala  Ser Thr Gly Tyr Thr  Ile Ile Ser
    2495                2500                2505

Gly Lys  His Phe Tyr Phe Asn  Thr Asp Gly Ile Met  Gln Ile Gly
    2510                2515                2520

Val Phe  Lys Gly Pro Asp Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2525                2530                2535
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Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2540 2545 2550

Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn
2555 2560 2565

Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr
2570 2575 2580

Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr
2585 2590 2595

Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile
2600 2605 2610

Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala
2615 2620 2625

Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln
2630 2635 2640

Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly
2705 2710

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<211> 2710
<212> PRT
<213> Clostridium difficile

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<400> 108

Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
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Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
20 25 30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
35 40 45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr
50 55 60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65 70 75 80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
100 105 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
115 120 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
130 135 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145 150 155 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
165 170 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
180 185 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His

```
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
    290                 295                 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
                325                 330                 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
            340                 345                 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
        355                 360                 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
    370                 375                 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385                 390                 395                 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
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405 410 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
420 425 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
435 440 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
450 455 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465 470 475 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
485 490 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
500 505 510

Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
515 520 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
530 535 540

Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545 550 555 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
565 570 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
580 585 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
595 600 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser

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610 615 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625 630 635 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
645 650 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
660 665 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
675 680 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
690 695 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705 710 715 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser
725 730 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
740 745 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
755 760 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
770 775 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785 790 795 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
805 810 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser

820 825 830

Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
835 840 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
850 855 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865 870 875 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
885 890 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
900 905 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
915 920 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
930 935 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945 950 955 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
965 970 975

Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
980 985 990

Ala Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln
995 1000 1005

Leu Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val
1010 1015 1020

Leu Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu

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1025 1030 1035

Asp Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu
1040 1045 1050

His Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val
1055 1060 1065

Leu Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser
1070 1075 1080

Ile Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile
1085 1090 1095

Ala Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu
1100 1105 1110

Ile Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His
1115 1120 1125

Leu Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp
1130 1135 1140

Lys Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp
1145 1150 1155

Phe Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala
1160 1165 1170

Met Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His
1175 1180 1185

Phe Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser
1190 1195 1200

Ile Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser
1205 1210 1215

Lys Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp

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1220 1225 1230

Trp Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp
1235 1240 1245

Gly Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys
1250 1255 1260

Phe Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr
1265 1270 1275

Leu Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp
1280 1285 1290

Lys Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu
1295 1300 1305

Ile Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr
1310 1315 1320

Tyr Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn
1325 1330 1335

Leu Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val
1340 1345 1350

Arg Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu
1355 1360 1365

Ile Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu
1370 1375 1380

Ile Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn
1385 1390 1395

Lys Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile
1400 1405 1410

Ser Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu

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1415 1420 1425

Leu Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn
1430 1435 1440

Thr Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile
1445 1450 1455

Ala Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala
1460 1465 1470

Ile Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp
1475 1480 1485

Ser Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe
1490 1495 1500

Asn Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys
1505 1510 1515

Asp Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn
1520 1525 1530

Thr Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn
1535 1540 1545

Gln Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser
1550 1555 1560

Ser Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr
1565 1570 1575

Ser Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys
1580 1585 1590

Leu Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe
1595 1600 1605

Thr Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys

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1610 1615 1620

Asp Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr
1625 1630 1635

Ser Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val
1640 1645 1650

Val Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser
1655 1660 1665

Thr Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg
1670 1675 1680

Tyr Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu
1685 1690 1695

Ile Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu
1700 1705 1710

Ile Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile
1715 1720 1725

Asn Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly
1730 1735 1740

Ser Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys
1745 1750 1755

Ile Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln
1760 1765 1770

Ser Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu
1775 1780 1785

Ser Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu
1790 1795 1800

Asn Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn

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1805 1810 1815

Lys Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu
1820 1825 1830

Ile Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe
1835 1840 1845

Asn Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr
1850 1855 1860

Phe Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile
1865 1870 1875

Asn Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu
1880 1885 1890

Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala
1895 1900 1905

Asn Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln
1910 1915 1920

Ser Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn
1925 1930 1935

Asp Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys
1940 1945 1950

Tyr Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln
1955 1960 1965

Val Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile
1970 1975 1980

Ile Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe
1985 1990 1995

Asp Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp

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2000 2005 2010

Gly Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly
2015 2020 2025

Val Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2030 2035 2040

Thr Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
2045 2050 2055

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
2060 2065 2070

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr
2075 2080 2085

Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr
2090 2095 2100

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala
2105 2110 2115

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2120 2125 2130

Thr Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
2135 2140 2145

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2150 2155 2160

Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2165 2170 2175

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu
2180 2185 2190

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser

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2195 2200 2205

Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile
2225 2230 2235

Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn
2240 2245 2250

Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn
2255 2260 2265

Asn Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly
2270 2275 2280

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu
2285 2290 2295

Gly Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly
2300 2305 2310

Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp
2315 2320 2325

Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala
2330 2335 2340

Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr
2345 2350 2355

Phe Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2360 2365 2370

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser
2375 2380 2385

Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr

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2390 2395 2400

Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe
2405 2410 2415

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2420 2425 2430

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2435 2440 2445

Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg
2450 2455 2460

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val
2465 2470 2475

Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
2480 2485 2490

Asn Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser
2495 2500 2505

Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly
2510 2515 2520

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2525 2530 2535

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2540 2545 2550

Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn
2555 2560 2565

Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr
2570 2575 2580

Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr

2585 2590 2595

Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile
2600 2605 2610

Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala
2615 2620 2625

Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln
2630 2635 2640

Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly
2705 2710

<210> 109
<211> 2710
<212> PRT
<213> Clostridium difficile

<400> 109

Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1 5 10 15

Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
20 25 30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
35 40 45

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Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn
    50                  55                  60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65                  70                  75                  80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
            100                 105                 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
        115                 120                 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
    130                 135                 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255
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Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Pro Arg Pro Ser
    290                 295                 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
                325                 330                 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
            340                 345                 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
        355                 360                 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
    370                 375                 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385                 390                 395                 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
                405                 410                 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
            420                 425                 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
        435                 440                 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
    450                 455                 460
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```
Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465                 470                 475                 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
                485                 490                 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
            500                 505                 510

Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
        515                 520                 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
    530                 535                 540

Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545                 550                 555                 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
                565                 570                 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
            580                 585                 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
        595                 600                 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
    610                 615                 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625                 630                 635                 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
                645                 650                 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
            660                 665                 670
```

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```
Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
        675                 680                 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
    690                 695                 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705                 710                 715                 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser
                725                 730                 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
            740                 745                 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
        755                 760                 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
    770                 775                 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785                 790                 795                 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
                805                 810                 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
            820                 825                 830

Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
        835                 840                 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
    850                 855                 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865                 870                 875                 880
```

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```
Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
                885                 890                 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
            900                 905                 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
        915                 920                 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
    930                 935                 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945                 950                 955                 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
                965                 970                 975

Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
            980                 985                 990

Ala Gln Leu Phe Ser Thr Gly Leu  Asn Thr Ile Tyr Asp  Ser Ile Gln
        995                 1000                1005

Leu Val  Asn Leu Ile Ser Asn  Ala Val Asn Asp Thr  Ile Asn Val
    1010                1015                1020

Leu Pro  Thr Ile Thr Glu Gly  Ile Pro Ile Val Ser  Thr Ile Leu
    1025                1030                1035

Asp Gly  Ile Asn Leu Gly Ala  Ala Ile Lys Glu Leu  Leu Asp Glu
    1040                1045                1050

His Asp  Pro Leu Leu Lys Lys  Glu Leu Glu Ala Lys  Val Gly Val
    1055                1060                1065

Leu Ala  Ile Asn Met Ser Leu  Ser Ile Ala Ala Thr  Val Ala Ser
    1070                1075                1080
```

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```
Ile Val  Gly Ile Gly Ala Glu  Val Thr Ile Phe Leu  Leu Pro Ile
    1085                1090                1095

Ala Gly  Ile Ser Ala Gly Ile  Pro Ser Leu Val Asn  Asn Glu Leu
    1100                1105                1110

Ile Leu  His Asp Lys Ala Thr  Ser Val Val Asn Tyr  Phe Asn His
    1115                1120                1125

Leu Ser  Glu Ser Lys Glu Tyr  Gly Pro Leu Lys Thr  Glu Asp Asp
    1130                1135                1140

Lys Ile  Leu Val Pro Ile Asp  Asp Leu Val Ile Ser  Glu Ile Asp
    1145                1150                1155

Phe Asn  Asn Asn Ser Ile Lys  Leu Gly Thr Cys Asn  Ile Leu Ala
    1160                1165                1170

Met Glu  Gly Gly Ser Gly His  Thr Val Thr Gly Asn  Ile Asp His
    1175                1180                1185

Phe Phe  Ser Ser Pro Tyr Ile  Ser Ser His Ile Pro  Ser Leu Ser
    1190                1195                1200

Val Tyr  Ser Ala Ile Gly Ile  Lys Thr Glu Asn Leu  Asp Phe Ser
    1205                1210                1215

Lys Lys  Ile Met Met Leu Pro  Asn Ala Pro Ser Arg  Val Phe Trp
    1220                1225                1230

Trp Glu  Thr Gly Ala Val Pro  Gly Leu Arg Ser Leu  Glu Asn Asn
    1235                1240                1245

Gly Thr  Lys Leu Leu Asp Ser  Ile Arg Asp Leu Tyr  Pro Gly Lys
    1250                1255                1260

Phe Tyr  Trp Arg Phe Tyr Ala  Phe Phe Asp Tyr Ala  Ile Thr Thr
    1265                1270                1275
```

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```
Leu Lys  Pro Val Tyr Glu Asp  Thr Asn Thr Lys Ile  Lys Leu Asp
    1280                1285                1290

Lys Asp  Thr Arg Asn Phe Ile  Met Pro Thr Ile Thr  Thr Asp Glu
    1295                1300                1305

Ile Arg  Asn Lys Leu Ser Tyr  Ser Phe Asp Gly Ala  Gly Gly Thr
    1310                1315                1320

Tyr Ser  Leu Leu Leu Ser Ser  Tyr Pro Ile Ser Met  Asn Ile Asn
    1325                1330                1335

Leu Ser  Lys Asp Asp Leu Trp  Ile Phe Asn Ile Asp  Asn Glu Val
    1340                1345                1350

Arg Glu  Ile Ser Ile Glu Asn  Gly Thr Ile Lys Lys  Gly Asn Leu
    1355                1360                1365

Ile Glu  Asp Val Leu Ser Lys  Ile Asp Ile Asn Lys  Asn Lys Leu
    1370                1375                1380

Ile Ile  Gly Asn Gln Thr Ile  Asp Phe Ser Gly Asp  Ile Asp Asn
    1385                1390                1395

Lys Asp  Arg Tyr Ile Phe Leu  Thr Cys Glu Leu Asp  Asp Lys Ile
    1400                1405                1410

Ser Leu  Ile Ile Glu Ile Asn  Leu Val Ala Lys Ser  Tyr Ser Leu
    1415                1420                1425

Leu Leu  Ser Gly Asp Lys Asn  Tyr Leu Ile Ser Asn  Leu Ser Asn
    1430                1435                1440

Thr Ile  Glu Lys Ile Asn Thr  Leu Gly Leu Asp Ser  Lys Asn Ile
    1445                1450                1455

Ala Tyr  Asn Tyr Thr Asp Glu  Ser Asn Asn Lys Tyr  Phe Gly Ala
    1460                1465                1470
```

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```
Ile Ser  Lys Thr Ser Gln Lys  Ser Ile Ile His Tyr  Lys Lys Asp
    1475                1480                1485

Ser Lys  Asn Ile Leu Glu Phe  Tyr Asn Gly Ser Thr  Leu Glu Phe
    1490                1495                1500

Asn Ser  Lys Asp Phe Ile Ala  Glu Asp Ile Asn Val  Phe Met Lys
    1505                1510                1515

Asp Asp  Ile Asn Thr Ile Thr  Gly Lys Tyr Tyr Val  Asp Asn Asn
    1520                1525                1530

Thr Asp  Lys Ser Ile Asp Phe  Ser Ile Ser Leu Val  Ser Lys Asn
    1535                1540                1545

Gln Val  Lys Val Asn Gly Leu  Tyr Leu Asn Glu Ser  Val Tyr Ser
    1550                1555                1560

Ser Tyr  Leu Asp Phe Val Lys  Asn Ser Asp Gly His  His Asn Thr
    1565                1570                1575

Ser Asn  Phe Met Asn Leu Phe  Leu Asn Asn Ile Ser  Phe Trp Lys
    1580                1585                1590

Leu Phe  Gly Phe Glu Asn Ile  Asn Phe Val Ile Asp  Lys Tyr Phe
    1595                1600                1605

Thr Leu  Val Gly Lys Thr Asn  Leu Gly Tyr Val Glu  Phe Ile Cys
    1610                1615                1620

Asp Asn  Asn Lys Asn Ile Asp  Ile Tyr Phe Gly Glu  Trp Lys Thr
    1625                1630                1635

Ser Ser  Ser Lys Ser Thr Ile  Phe Ser Gly Asn Gly  Arg Asn Val
    1640                1645                1650

Val Val  Glu Pro Ile Tyr Asn  Pro Asp Thr Gly Glu  Asp Ile Ser
    1655                1660                1665
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Thr Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg
1670 1675 1680

Tyr Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu
1685 1690 1695

Ile Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu
1700 1705 1710

Ile Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile
1715 1720 1725

Asn Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly
1730 1735 1740

Ser Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys
1745 1750 1755

Ile Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln
1760 1765 1770

Ser Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu
1775 1780 1785

Ser Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu
1790 1795 1800

Asn Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn
1805 1810 1815

Lys Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu
1820 1825 1830

Ile Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Ser
1835 1840 1845

Asn Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr
1850 1855 1860

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```
Phe Asp  Ile Asn Thr Gly Ala  Ala Ser Thr Ser Tyr  Lys Ile Ile
    1865                1870                1875

Asn Gly  Lys His Phe Tyr Phe  Asn Asn Asn Gly Val  Met Gln Leu
    1880                1885                1890

Gly Val  Phe Lys Gly Pro Asp  Gly Phe Glu Tyr Phe  Ala Pro Ala
    1895                1900                1905

Asn Thr  Gln Asn Asn Asn Ile  Glu Gly Gln Ala Ile  Val Tyr Gln
    1910                1915                1920

Ser Lys  Phe Leu Thr Leu Asn  Gly Lys Lys Tyr Tyr  Phe Asp Asn
    1925                1930                1935

Asp Ser  Lys Ala Val Thr Gly  Trp Arg Ile Ile Asn  Asn Glu Lys
    1940                1945                1950

Tyr Tyr  Phe Asn Pro Asn Asn  Ala Ile Ala Ala Val  Gly Leu Gln
    1955                1960                1965

Val Ile  Asp Asn Asn Lys Tyr  Tyr Phe Asn Pro Asp  Thr Ala Ile
    1970                1975                1980

Ile Ser  Lys Gly Trp Gln Thr  Val Asn Gly Ser Arg  Tyr Tyr Phe
    1985                1990                1995

Asp Thr  Asp Thr Ala Ile Ala  Phe Asn Gly Tyr Lys  Thr Ile Asp
    2000                2005                2010

Gly Lys  His Phe Tyr Phe Asp  Ser Asp Cys Val Val  Lys Ile Gly
    2015                2020                2025

Val Phe  Ser Gly Ser Asn Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2030                2035                2040

Thr Tyr  Asn Asn Asn Ile Glu  Gly Gln Ala Ile Val  Tyr Gln Ser
    2045                2050                2055
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Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
2060 2065 2070

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr
2075 2080 2085

Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr
2090 2095 2100

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala
2105 2110 2115

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2120 2125 2130

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
2135 2140 2145

Lys Tyr Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2150 2155 2160

Phe Lys Val Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2165 2170 2175

His Asn Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Lys
2180 2185 2190

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser
2195 2200 2205

Lys Ala Ile Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Asn Asn Ala Ile Ala Ala Thr His Leu Cys Thr Ile
2225 2230 2235

Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn
2240 2245 2250

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Gly Tyr  Ile Thr Ile Glu Arg  Asn Asn Phe Tyr Phe  Asp Ala Asn
    2255                2260                2265

Asn Glu  Ser Lys Met Val Thr  Gly Val Phe Lys Gly  Pro Asn Gly
    2270                2275                2280

Phe Glu  Tyr Phe Ala Pro Ala  Asn Thr His Asn Asn  Asn Ile Glu
    2285                2290                2295

Gly Gln  Ala Ile Val Tyr Gln  Asn Lys Phe Leu Thr  Leu Asn Gly
    2300                2305                2310

Lys Lys  Tyr Tyr Phe Asp Asn  Asp Ser Lys Ala Val  Thr Gly Trp
    2315                2320                2325

Gln Thr  Ile Asp Ser Lys Lys  Tyr Tyr Phe Asn Leu  Asn Thr Ala
    2330                2335                2340

Val Ala  Val Thr Gly Trp Gln  Thr Ile Asp Gly Glu  Lys Tyr Tyr
    2345                2350                2355

Phe Asn  Leu Asn Thr Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile
    2360                2365                2370

Asp Gly  Lys Arg Tyr Tyr Phe  Asn Thr Asn Thr Tyr  Ile Ala Ser
    2375                2380                2385

Thr Gly  Tyr Thr Ile Ile Asn  Gly Lys His Phe Tyr  Phe Asn Thr
    2390                2395                2400

Asp Gly  Ile Met Gln Ile Gly  Val Phe Lys Gly Pro  Asp Gly Phe
    2405                2410                2415

Glu Tyr  Phe Ala Pro Ala Asn  Thr His Asn Asn Asn  Ile Glu Gly
    2420                2425                2430

Gln Ala  Ile Leu Tyr Gln Asn  Lys Phe Leu Thr Leu  Asn Gly Lys
    2435                2440                2445
```

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```
Lys Tyr  Tyr Phe Gly Ser Asp  Ser Lys Ala Val Thr  Gly Leu Arg
    2450                 2455                 2460

Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn Thr Asn  Thr Ala Val
    2465                 2470                 2475

Ala Val  Thr Gly Trp Gln Thr  Ile Asn Gly Lys Lys  Tyr Tyr Phe
    2480                 2485                 2490

Asn Thr  Asn Thr Tyr Ile Ala  Ser Thr Gly Tyr Thr  Ile Ile Ser
    2495                 2500                 2505

Gly Lys  His Phe Tyr Phe Asn  Thr Asp Gly Ile Met  Gln Ile Gly
    2510                 2515                 2520

Val Phe  Lys Gly Pro Asp Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2525                 2530                 2535

Thr Asp  Ala Asn Asn Ile Glu  Gly Gln Ala Ile Arg  Tyr Gln Asn
    2540                 2545                 2550

Arg Phe  Leu Tyr Leu His Asp  Asn Ile Tyr Tyr Phe  Gly Asn Asp
    2555                 2560                 2565

Ser Lys  Ala Ala Thr Gly Trp  Ala Thr Ile Asp Gly  Asn Arg Tyr
    2570                 2575                 2580

Tyr Phe  Glu Pro Asn Thr Ala  Met Gly Ala Asn Gly  Tyr Lys Thr
    2585                 2590                 2595

Ile Asp  Asn Lys Asn Phe Tyr  Phe Arg Asn Gly Leu  Pro Gln Ile
    2600                 2605                 2610

Gly Val  Phe Lys Gly Pro Asn  Gly Phe Glu Tyr Phe  Ala Pro Ala
    2615                 2620                 2625

Asn Thr  Asp Ala Asn Asn Ile  Asp Gly Gln Ala Ile  Arg Tyr Gln
    2630                 2635                 2640
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Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Ser Lys Val
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly
2705 2710

<210> 110
<211> 2366
<212> PRT
<213> Clostridium difficile

<400> 110

Met Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg
1 5 10 15

Phe Arg Val Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
20 25 30

Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
35 40 45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
50 55 60

Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65 70 75 80

Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys
85 90 95

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```
Asn Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
            100                 105                 110

Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
        115                 120                 125

Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
    130                 135                 140

Ile Val Glu Ser Ala Thr Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145                 150                 155                 160

Leu Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Tyr Arg Lys Arg Met
                165                 170                 175

Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Thr
            180                 185                 190

Gln Arg Glu Glu Asn Pro Asp Leu Ile Ile Asp Asp Ile Val Lys Ile
        195                 200                 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Asp Ile Asp Glu Leu Asn Ser Tyr
    210                 215                 220

Ile Glu Glu Ser Leu Asn Lys Val Thr Glu Asn Ser Gly Asn Asp Val
225                 230                 235                 240

Arg Asn Phe Glu Glu Phe Lys Gly Gly Glu Ser Phe Lys Leu Tyr Glu
                245                 250                 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu
            260                 265                 270

Arg Ile Ser Ala Leu Lys Glu Val Gly Gly Val Tyr Leu Asp Val Asp
        275                 280                 285

Met Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro
    290                 295                 300
```

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```
Ser Ser Val Thr Val Asp Phe Trp Glu Met Val Lys Leu Glu Ala Ile
305                 310                 315                 320

Met Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp
                325                 330                 335

Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
            340                 345                 350

Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala
        355                 360                 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn
    370                 375                 380

Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val
385                 390                 395                 400

Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro
                405                 410                 415

Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Ala Phe Ile
            420                 425                 430

Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met
        435                 440                 445

Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr
    450                 455                 460

Thr Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp
465                 470                 475                 480

Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala
                485                 490                 495

Asp Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr
            500                 505                 510
```

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```
Glu Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys
        515                 520                 525

Ala Gln Phe Glu Glu Tyr Lys Lys Asn Tyr Phe Glu Gly Ser Leu Gly
    530                 535                 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Thr Val Val Asp Lys Glu
545                 550                 555                 560

Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly
                565                 570                 575

Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
            580                 585                 590

Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe
        595                 600                 605

Gln Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly
    610                 615                 620

Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile
625                 630                 635                 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp
                645                 650                 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser
            660                 665                 670

Thr Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro
        675                 680                 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser
    690                 695                 700

Val Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Arg Val Lys
705                 710                 715                 720
```

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```
Asp Lys Val Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
                725                 730                 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg
            740                 745                 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
        755                 760                 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
    770                 775                 780

Asn Lys Ile Ile Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785                 790                 795                 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu
                805                 810                 815

Glu Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
            820                 825                 830

Asp Thr Gln Val Val Glu Gly Arg Ile Glu Glu Ala Lys Ser Leu Thr
        835                 840                 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser
    850                 855                 860

Ile Ser Asp Ala Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Glu Glu
865                 870                 875                 880

Ser His Phe Ile Ser Phe Glu Asp Ile Leu Glu Thr Asp Glu Gly Phe
                885                 890                 895

Ser Ile Arg Phe Ile Asp Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
            900                 905                 910

Thr Glu Lys Ala Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu
        915                 920                 925
```

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```
Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
    930                 935                 940

Val Lys Lys Val Asn Leu Asp Ala Thr His Glu Val Asn Thr Leu Asn
945                 950                 955                 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu
                965                 970                 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
            980                 985                 990

Leu Phe Ser Thr Gly Leu Asn Thr  Ile Thr Asp Ala Ala  Lys Val Val
        995                 1000                1005

Glu Leu  Val Ser Thr Ala Leu  Asp Glu Thr Ile Asp  Leu Leu Pro
    1010                1015                1020

Thr Leu  Ser Glu Gly Leu Pro  Val Ile Ala Thr Ile  Ile Asp Gly
    1025                1030                1035

Val Ser  Leu Gly Ala Ala Ile  Lys Glu Leu Ser Glu  Thr Ser Asp
    1040                1045                1050

Pro Leu  Leu Arg Gln Glu Ile  Glu Ala Lys Ile Gly  Ile Met Ala
    1055                1060                1065

Val Asn  Leu Thr Ala Ala Thr  Thr Ala Ile Ile Thr  Ser Ser Leu
    1070                1075                1080

Gly Ile  Ala Ser Gly Phe Ser  Ile Leu Leu Val Pro  Leu Ala Gly
    1085                1090                1095

Ile Ser  Ala Gly Ile Pro Ser  Leu Val Asn Asn Glu  Leu Ile Leu
    1100                1105                1110

Arg Asp  Lys Ala Thr Lys Val  Val Asp Tyr Phe Ser  His Ile Ser
    1115                1120                1125
```

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```
Leu Ala  Glu Ser Glu Gly Ala  Phe Thr Ser Leu Asp  Asp Lys Ile
    1130                1135                1140

Met Met  Pro Gln Asp Asp Leu  Val Ile Ser Glu Ile  Asp Phe Asn
    1145                1150                1155

Asn Asn  Ser Ile Thr Leu Gly  Lys Cys Glu Ile Trp  Arg Met Glu
    1160                1165                1170

Gly Gly  Ser Gly His Thr Val  Thr Asp Asp Ile Asp  His Phe Phe
    1175                1180                1185

Ser Ala  Pro Ser Ile Thr Tyr  Arg Glu Pro His Leu  Ser Ile Tyr
    1190                1195                1200

Asp Val  Leu Glu Val Gln Lys  Glu Glu Leu Asp Leu  Ser Lys Asp
    1205                1210                1215

Leu Met  Val Leu Pro Asn Ala  Pro Asn Arg Val Phe  Ala Trp Glu
    1220                1225                1230

Thr Gly  Trp Thr Pro Gly Leu  Arg Ser Leu Glu Asn  Asp Gly Thr
    1235                1240                1245

Lys Leu  Leu Asp Arg Ile Arg  Asp Asn Tyr Glu Gly  Glu Phe Tyr
    1250                1255                1260

Trp Arg  Tyr Phe Ala Phe Ile  Ala Asp Ala Leu Ile  Thr Thr Leu
    1265                1270                1275

Lys Pro  Arg Tyr Glu Asp Thr  Asn Ile Arg Ile Asn  Leu Asp Ser
    1280                1285                1290

Asn Thr  Arg Ser Phe Ile Val  Pro Val Ile Thr Thr  Glu Tyr Ile
    1295                1300                1305

Arg Glu  Lys Leu Ser Tyr Ser  Phe Tyr Gly Ser Gly  Gly Thr Tyr
    1310                1315                1320
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```
Ala Leu  Ser Leu Ser Gln Tyr  Asn Met Asn Ile Asn  Ile Glu Leu
    1325                1330                1335

Asn Glu  Asn Asp Thr Trp Val  Ile Asp Val Asp Asn  Val Val Arg
    1340                1345                1350

Asp Val  Thr Ile Glu Ser Asp  Lys Ile Lys Lys Gly  Asp Leu Ile
    1355                1360                1365

Glu Asn  Ile Leu Ser Lys Leu  Ser Ile Glu Asp Asn  Lys Ile Ile
    1370                1375                1380

Leu Asp  Asn His Glu Ile Asn  Phe Ser Gly Thr Leu  Asn Gly Gly
    1385                1390                1395

Asn Gly  Phe Val Ser Leu Thr  Phe Ser Ile Leu Glu  Gly Ile Asn
    1400                1405                1410

Ala Val  Ile Glu Val Asp Leu  Leu Ser Lys Ser Tyr  Lys Val Leu
    1415                1420                1425

Ile Ser  Gly Glu Leu Lys Thr  Leu Met Ala Asn Ser  Asn Ser Val
    1430                1435                1440

Gln Gln  Lys Ile Asp Tyr Ile  Gly Leu Asn Ser Glu  Leu Gln Lys
    1445                1450                1455

Asn Ile  Pro Tyr Ser Phe Met  Asp Asp Lys Gly Lys  Glu Asn Gly
    1460                1465                1470

Phe Ile  Asn Cys Ser Thr Lys  Glu Gly Leu Phe Val  Ser Glu Leu
    1475                1480                1485

Ser Asp  Val Val Leu Ile Ser  Lys Val Tyr Met Asp  Asn Ser Lys
    1490                1495                1500

Pro Leu  Phe Gly Tyr Cys Ser  Asn Asp Leu Lys Asp  Val Lys Val
    1505                1510                1515
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Ile Thr Lys Asp Asp Val Ile Ile Leu Thr Gly Tyr Tyr Leu Lys
1520 1525 1530

Asp Asp Ile Lys Ile Ser Leu Ser Phe Thr Ile Gln Asp Glu Asn
1535 1540 1545

Thr Ile Lys Leu Asn Gly Val Tyr Leu Asp Glu Asn Gly Val Ala
1550 1555 1560

Glu Ile Leu Lys Phe Met Asn Lys Lys Gly Ser Thr Asn Thr Ser
1565 1570 1575

Asp Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile
1580 1585 1590

Phe Ile Asn Ser Leu Gln Ser Asn Thr Lys Leu Ile Leu Asp Thr
1595 1600 1605

Asn Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe
1610 1615 1620

Ile Cys Asp Lys Asp Asn Asn Ile Gln Pro Tyr Phe Ile Lys Phe
1625 1630 1635

Asn Thr Leu Glu Thr Lys Tyr Thr Leu Tyr Val Gly Asn Arg Gln
1640 1645 1650

Asn Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp
1655 1660 1665

Ile Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly
1670 1675 1680

Ile Asp Ser Cys Val Asn Lys Val Ile Ile Ser Pro Asn Ile Tyr
1685 1690 1695

Thr Asp Glu Ile Asn Ile Thr Pro Ile Tyr Glu Ala Asn Asn Thr
1700 1705 1710

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```
Tyr Pro  Glu Val Ile Val Leu  Asp Thr Asn Tyr Ile  Ser Glu Lys
    1715                1720                1725

Ile Asn  Ile Asn Ile Asn Asp  Leu Ser Ile Arg Tyr  Val Trp Ser
    1730                1735                1740

Asn Asp  Gly Ser Asp Phe Ile  Leu Met Ser Thr Asp  Glu Glu Asn
    1745                1750                1755

Lys Val  Ser Gln Val Lys Ile  Arg Phe Thr Asn Val  Phe Lys Gly
    1760                1765                1770

Asn Thr  Ile Ser Asp Lys Ile  Ser Phe Asn Phe Ser  Asp Lys Gln
    1775                1780                1785

Asp Val  Ser Ile Asn Lys Val  Ile Ser Thr Phe Thr  Pro Ser Tyr
    1790                1795                1800

Tyr Val  Glu Gly Leu Leu Asn  Tyr Asp Leu Gly Leu  Ile Ser Leu
    1805                1810                1815

Tyr Asn  Glu Lys Phe Tyr Ile  Asn Asn Phe Gly Met  Met Val Ser
    1820                1825                1830

Gly Leu  Val Tyr Ile Asn Asp  Ser Leu Tyr Tyr Phe  Lys Pro Pro
    1835                1840                1845

Ile Lys  Asn Leu Ile Thr Gly  Phe Thr Thr Ile Gly  Asp Asp Lys
    1850                1855                1860

Tyr Tyr  Phe Asn Pro Asp Asn  Gly Gly Ala Ala Ser  Val Gly Glu
    1865                1870                1875

Thr Ile  Ile Asp Gly Lys Asn  Tyr Tyr Phe Ser Gln  Asn Gly Val
    1880                1885                1890

Leu Gln  Thr Gly Val Phe Ser  Thr Glu Asp Gly Phe  Lys Tyr Phe
    1895                1900                1905
```

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```
Ala Pro  Ala Asp Thr Leu Asp  Glu Asn Leu Glu Gly  Glu Ala Ile
    1910                1915                1920

Asp Phe  Thr Gly Lys Leu Thr  Ile Asp Glu Asn Val  Tyr Tyr Phe
    1925                1930                1935

Gly Asp  Asn Tyr Arg Ala Ala  Ile Glu Trp Gln Thr  Leu Asp Asp
    1940                1945                1950

Glu Val  Tyr Tyr Phe Ser Thr  Asp Thr Gly Arg Ala  Phe Lys Gly
    1955                1960                1965

Leu Asn  Gln Ile Gly Asp Asp  Lys Phe Tyr Phe Asn  Ser Asp Gly
    1970                1975                1980

Ile Met  Gln Lys Gly Phe Val  Asn Ile Asn Asp Lys  Thr Phe Tyr
    1985                1990                1995

Phe Asp  Asp Ser Gly Val Met  Lys Ser Gly Tyr Thr  Glu Ile Asp
    2000                2005                2010

Gly Lys  Tyr Phe Tyr Phe Ala  Glu Asn Gly Glu Met  Gln Ile Gly
    2015                2020                2025

Val Phe  Asn Thr Ala Asp Gly  Phe Lys Tyr Phe Ala  His His Asp
    2030                2035                2040

Glu Asp  Leu Gly Asn Glu Glu  Gly Glu Ala Leu Ser  Tyr Ser Gly
    2045                2050                2055

Ile Leu  Asn Phe Asn Asn Lys  Ile Tyr Tyr Phe Asp  Asp Ser Phe
    2060                2065                2070

Thr Ala  Val Val Gly Trp Lys  Asp Leu Glu Asp Gly  Ser Lys Tyr
    2075                2080                2085

Tyr Phe  Asp Glu Asp Thr Ala  Glu Ala Tyr Ile Gly  Ile Ser Ile
    2090                2095                2100
```

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```
Ile Asn  Asp Gly Lys Tyr Tyr  Phe Asn Asp Ser Gly  Ile Met Gln
    2105                 2110                 2115

Ile Gly  Phe Val Thr Ile Asn  Asn Glu Val Phe Tyr  Phe Ser Asp
    2120                 2125                 2130

Ser Gly  Ile Val Glu Ser Gly  Met Gln Asn Ile Asp  Asp Asn Tyr
    2135                 2140                 2145

Phe Tyr  Ile Asp Glu Asn Gly  Leu Val Gln Ile Gly  Val Phe Asp
    2150                 2155                 2160

Thr Ser  Asp Gly Tyr Lys Tyr  Phe Ala Pro Ala Asn  Thr Val Asn
    2165                 2170                 2175

Asp Asn  Ile Tyr Gly Gln Ala  Val Glu Tyr Ser Gly  Leu Val Arg
    2180                 2185                 2190

Val Gly  Glu Asp Val Tyr Tyr  Phe Gly Glu Thr Tyr  Thr Ile Glu
    2195                 2200                 2205

Thr Gly  Trp Ile Tyr Asp Met  Glu Asn Glu Ser Asp  Lys Tyr Tyr
    2210                 2215                 2220

Phe Asp  Pro Glu Thr Lys Lys  Ala Tyr Lys Gly Ile  Asn Val Ile
    2225                 2230                 2235

Asp Asp  Ile Lys Tyr Tyr Phe  Asp Glu Asn Gly Ile  Met Arg Thr
    2240                 2245                 2250

Gly Leu  Ile Thr Phe Glu Asp  Asn His Tyr Tyr Phe  Asn Glu Asp
    2255                 2260                 2265

Gly Ile  Met Gln Tyr Gly Tyr  Leu Asn Ile Glu Asp  Lys Thr Phe
    2270                 2275                 2280

Tyr Phe  Ser Glu Asp Gly Ile  Met Gln Ile Gly Val  Phe Asn Thr
    2285                 2290                 2295
```

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Pro Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu
2300 2305 2310

Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu
2315 2320 2325

Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr
2330 2335 2340

Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp
2345 2350 2355

Thr Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 111
<211> 2366
<212> PRT
<213> Clostridium difficile

<400> 111

Met Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg
1 5 10 15

Phe Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
20 25 30

Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
35 40 45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
50 55 60

Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65 70 75 80

Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys
85 90 95

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```
Asn Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
            100                 105                 110

Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
        115                 120                 125

Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
    130                 135                 140

Val Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145                 150                 155                 160

Leu Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met
                165                 170                 175

Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala
            180                 185                 190

Gln Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr
        195                 200                 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr
    210                 215                 220

Ile Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val
225                 230                 235                 240

Arg Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu
                245                 250                 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu
            260                 265                 270

Arg Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp
        275                 280                 285

Met Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro
    290                 295                 300
```

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```
Ser Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile
305                 310                 315                 320

Met Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp
                325                 330                 335

Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
            340                 345                 350

Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala
        355                 360                 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn
    370                 375                 380

Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val
385                 390                 395                 400

Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro
                405                 410                 415

Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile
            420                 425                 430

Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met
        435                 440                 445

Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr
    450                 455                 460

Thr Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp
465                 470                 475                 480

Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala
                485                 490                 495

Asp Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr
            500                 505                 510
```

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```
Glu Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys
        515                 520                 525

Ala Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly
    530                 535                 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu
545                 550                 555                 560

Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly
                565                 570                 575

Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
            580                 585                 590

Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe
        595                 600                 605

Gln Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly
    610                 615                 620

Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile
625                 630                 635                 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp
                645                 650                 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser
            660                 665                 670

Thr Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro
        675                 680                 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser
    690                 695                 700

Ile Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys
705                 710                 715                 720
```

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```
Asp Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
                725                 730                 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg
            740                 745                 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
        755                 760                 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
    770                 775                 780

Asn Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785                 790                 795                 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu
                805                 810                 815

Glu Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
            820                 825                 830

Asp Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr
        835                 840                 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser
    850                 855                 860

Ile Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp
865                 870                 875                 880

Ser His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe
                885                 890                 895

Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
            900                 905                 910

Thr Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu
        915                 920                 925
```

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```
Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
    930                 935                 940

Val Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn
945                 950                 955                 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu
                965                 970                 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
            980                 985                 990

Leu Phe Ser Thr Gly Leu Asn Thr  Ile Thr Asp Ala Ala  Lys Val Val
        995                 1000                1005

Glu Leu  Val Ser Thr Ala Leu  Asp Glu Thr Ile Asp  Leu Leu Pro
    1010                1015                1020

Thr Leu  Ser Glu Gly Leu Pro  Ile Ile Ala Thr Ile  Ile Asp Gly
    1025                1030                1035

Val Ser  Leu Gly Ala Ala Ile  Lys Glu Leu Ser Glu  Thr Ser Asp
    1040                1045                1050

Pro Leu  Leu Arg Gln Glu Ile  Glu Ala Lys Ile Gly  Ile Met Ala
    1055                1060                1065

Val Asn  Leu Thr Thr Ala Thr  Thr Ala Ile Ile Thr  Ser Ser Leu
    1070                1075                1080

Gly Val  Ala Ser Gly Phe Ser  Ile Leu Leu Val Pro  Leu Ala Gly
    1085                1090                1095

Ile Ser  Ala Gly Ile Pro Ser  Leu Val Asn Asn Glu  Leu Val Leu
    1100                1105                1110

Arg Asp  Lys Ala Thr Lys Val  Val Asp Tyr Phe Lys  His Val Ser
    1115                1120                1125
```

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```
Leu Val  Glu Thr Glu Gly Val  Phe Thr Leu Leu Asp  Asp Lys Ile
    1130                1135                1140

Met Met  Pro Gln Asp Asp Leu  Val Ile Ser Glu Ile  Asp Phe Asn
    1145                1150                1155

Asn Asn  Ser Ile Val Leu Gly  Lys Cys Glu Ile Trp  Arg Met Glu
    1160                1165                1170

Gly Gly  Ser Gly His Thr Val  Thr Asp Asp Ile Asp  His Phe Phe
    1175                1180                1185

Ser Ala  Pro Ser Ile Thr Tyr  Arg Glu Pro His Leu  Ser Ile Tyr
    1190                1195                1200

Asp Val  Leu Glu Val Gln Lys  Glu Glu Leu Asp Leu  Ser Lys Asp
    1205                1210                1215

Leu Met  Val Leu Pro Asn Ala  Pro Asn Arg Val Phe  Ala Trp Glu
    1220                1225                1230

Thr Gly  Trp Thr Pro Gly Leu  Arg Ser Leu Glu Asn  Asp Gly Thr
    1235                1240                1245

Lys Leu  Leu Asp Arg Ile Arg  Asp Asn Tyr Glu Gly  Glu Phe Tyr
    1250                1255                1260

Trp Arg  Tyr Phe Ala Phe Ile  Ala Asp Ala Leu Ile  Thr Thr Leu
    1265                1270                1275

Lys Pro  Arg Tyr Glu Asp Thr  Asn Ile Arg Ile Asn  Leu Asp Ser
    1280                1285                1290

Asn Thr  Arg Ser Phe Ile Val  Pro Ile Ile Thr Thr  Glu Tyr Ile
    1295                1300                1305

Arg Glu  Lys Leu Ser Tyr Ser  Phe Tyr Gly Ser Gly  Gly Thr Tyr
    1310                1315                1320
```

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```
Ala Leu  Ser Leu Ser Gln Tyr  Asn Met Gly Ile Asn  Ile Glu Leu
    1325                1330                1335

Ser Glu  Ser Asp Val Trp Ile  Ile Asp Val Asp Asn  Val Val Arg
    1340                1345                1350

Asp Val  Thr Ile Glu Ser Asp  Lys Ile Lys Lys Gly  Asp Leu Ile
    1355                1360                1365

Glu Gly  Ile Leu Ser Thr Leu  Ser Ile Glu Glu Asn  Lys Ile Ile
    1370                1375                1380

Leu Asn  Ser His Glu Ile Asn  Phe Ser Gly Glu Val  Asn Gly Ser
    1385                1390                1395

Asn Gly  Phe Val Ser Leu Thr  Phe Ser Ile Leu Glu  Gly Ile Asn
    1400                1405                1410

Ala Ile  Ile Glu Val Asp Leu  Leu Ser Lys Ser Tyr  Lys Leu Leu
    1415                1420                1425

Ile Ser  Gly Glu Leu Lys Ile  Leu Met Leu Asn Ser  Asn His Ile
    1430                1435                1440

Gln Gln  Lys Ile Asp Tyr Ile  Gly Phe Asn Ser Glu  Leu Gln Lys
    1445                1450                1455

Asn Ile  Pro Tyr Ser Phe Val  Asp Ser Glu Gly Lys  Glu Asn Gly
    1460                1465                1470

Phe Ile  Asn Gly Ser Thr Lys  Glu Gly Leu Phe Val  Ser Glu Leu
    1475                1480                1485

Pro Asp  Val Val Leu Ile Ser  Lys Val Tyr Met Asp  Asp Ser Lys
    1490                1495                1500

Pro Ser  Phe Gly Tyr Tyr Ser  Asn Asn Leu Lys Asp  Val Lys Val
    1505                1510                1515
```

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```
Ile Thr  Lys Asp Asn Val Asn  Ile Leu Thr Gly Tyr  Tyr Leu Lys
    1520                1525                1530

Asp Asp  Ile Lys Ile Ser Leu  Ser Leu Thr Leu Gln  Asp Glu Lys
    1535                1540                1545

Thr Ile  Lys Leu Asn Ser Val  His Leu Asp Glu Ser  Gly Val Ala
    1550                1555                1560

Glu Ile  Leu Lys Phe Met Asn  Arg Lys Gly Asn Thr  Asn Thr Ser
    1565                1570                1575

Asp Ser  Leu Met Ser Phe Leu  Glu Ser Met Asn Ile  Lys Ser Ile
    1580                1585                1590

Phe Val  Asn Phe Leu Gln Ser  Asn Ile Lys Phe Ile  Leu Asp Ala
    1595                1600                1605

Asn Phe  Ile Ile Ser Gly Thr  Thr Ser Ile Gly Gln  Phe Glu Phe
    1610                1615                1620

Ile Cys  Asp Glu Asn Asp Asn  Ile Gln Pro Tyr Phe  Ile Lys Phe
    1625                1630                1635

Asn Thr  Leu Glu Thr Asn Tyr  Thr Leu Tyr Val Gly  Asn Arg Gln
    1640                1645                1650

Asn Met  Ile Val Glu Pro Asn  Tyr Asp Leu Asp Asp  Ser Gly Asp
    1655                1660                1665

Ile Ser  Ser Thr Val Ile Asn  Phe Ser Gln Lys Tyr  Leu Tyr Gly
    1670                1675                1680

Ile Asp  Ser Cys Val Asn Lys  Val Val Ile Ser Pro  Asn Ile Tyr
    1685                1690                1695

Thr Asp  Glu Ile Asn Ile Thr  Pro Val Tyr Glu Thr  Asn Asn Thr
    1700                1705                1710
```

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```
Tyr Pro  Glu Val Ile Val Leu  Asp Ala Asn Tyr Ile  Asn Glu Lys
    1715                1720                1725

Ile Asn  Val Asn Ile Asn Asp  Leu Ser Ile Arg Tyr  Val Trp Ser
    1730                1735                1740

Asn Asp  Gly Asn Asp Phe Ile  Leu Met Ser Thr Ser  Glu Glu Asn
    1745                1750                1755

Lys Val  Ser Gln Val Lys Ile  Arg Phe Val Asn Val  Phe Lys Asp
    1760                1765                1770

Lys Thr  Leu Ala Asn Lys Leu  Ser Phe Asn Phe Ser  Asp Lys Gln
    1775                1780                1785

Asp Val  Pro Val Ser Glu Ile  Ile Leu Ser Phe Thr  Pro Ser Tyr
    1790                1795                1800

Tyr Glu  Asp Gly Leu Ile Gly  Tyr Asp Leu Gly Leu  Val Ser Leu
    1805                1810                1815

Tyr Asn  Glu Lys Phe Tyr Ile  Asn Asn Phe Gly Met  Met Val Ser
    1820                1825                1830

Gly Leu  Ile Tyr Ile Asn Asp  Ser Leu Tyr Tyr Phe  Lys Pro Pro
    1835                1840                1845

Val Asn  Asn Leu Ile Thr Gly  Phe Val Thr Val Gly  Asp Asp Lys
    1850                1855                1860

Tyr Tyr  Phe Asn Pro Ile Asn  Gly Gly Ala Ala Ser  Ile Gly Glu
    1865                1870                1875

Thr Ile  Ile Asp Asp Lys Asn  Tyr Tyr Phe Asn Gln  Ser Gly Val
    1880                1885                1890

Leu Gln  Thr Gly Val Phe Ser  Thr Glu Asp Gly Phe  Lys Tyr Phe
    1895                1900                1905
```

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```
Ala Pro  Ala Asn Thr Leu Asp  Glu Asn Leu Glu Gly  Glu Ala Ile
    1910                1915                1920

Asp Phe  Thr Gly Lys Leu Ile  Ile Asp Glu Asn Ile  Tyr Tyr Phe
    1925                1930                1935

Asp Asp  Asn Tyr Arg Gly Ala  Val Glu Trp Lys Glu  Leu Asp Gly
    1940                1945                1950

Glu Met  His Tyr Phe Ser Pro  Glu Thr Gly Lys Ala  Phe Lys Gly
    1955                1960                1965

Leu Asn  Gln Ile Gly Asp Tyr  Lys Tyr Tyr Phe Asn  Ser Asp Gly
    1970                1975                1980

Val Met  Gln Lys Gly Phe Val  Ser Ile Asn Asp Asn  Lys His Tyr
    1985                1990                1995

Phe Asp  Asp Ser Gly Val Met  Lys Val Gly Tyr Thr  Glu Ile Asp
    2000                2005                2010

Gly Lys  His Phe Tyr Phe Ala  Glu Asn Gly Glu Met  Gln Ile Gly
    2015                2020                2025

Val Phe  Asn Thr Glu Asp Gly  Phe Lys Tyr Phe Ala  His His Asn
    2030                2035                2040

Glu Asp  Leu Gly Asn Glu Glu  Gly Glu Glu Ile Ser  Tyr Ser Gly
    2045                2050                2055

Ile Leu  Asn Phe Asn Asn Lys  Ile Tyr Tyr Phe Asp  Asp Ser Phe
    2060                2065                2070

Thr Ala  Val Val Gly Trp Lys  Asp Leu Glu Asp Gly  Ser Lys Tyr
    2075                2080                2085

Tyr Phe  Asp Glu Asp Thr Ala  Glu Ala Tyr Ile Gly  Leu Ser Leu
    2090                2095                2100
```

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```
Ile Asn  Asp Gly Gln Tyr Tyr  Phe Asn Asp Asp Gly  Ile Met Gln
    2105                2110                2115

Val Gly  Phe Val Thr Ile Asn  Asp Lys Val Phe Tyr  Phe Ser Asp
    2120                2125                2130

Ser Gly  Ile Ile Glu Ser Gly  Val Gln Asn Ile Asp  Asp Asn Tyr
    2135                2140                2145

Phe Tyr  Ile Asp Asp Asn Gly  Ile Val Gln Ile Gly  Val Phe Asp
    2150                2155                2160

Thr Ser  Asp Gly Tyr Lys Tyr  Phe Ala Pro Ala Asn  Thr Val Asn
    2165                2170                2175

Asp Asn  Ile Tyr Gly Gln Ala  Val Glu Tyr Ser Gly  Leu Val Arg
    2180                2185                2190

Val Gly  Glu Asp Val Tyr Tyr  Phe Gly Glu Thr Tyr  Thr Ile Glu
    2195                2200                2205

Thr Gly  Trp Ile Tyr Asp Met  Glu Asn Glu Ser Asp  Lys Tyr Tyr
    2210                2215                2220

Phe Asn  Pro Glu Thr Lys Lys  Ala Cys Lys Gly Ile  Asn Leu Ile
    2225                2230                2235

Asp Asp  Ile Lys Tyr Tyr Phe  Asp Glu Lys Gly Ile  Met Arg Thr
    2240                2245                2250

Gly Leu  Ile Ser Phe Glu Asn  Asn Asn Tyr Tyr Phe  Asn Glu Asn
    2255                2260                2265

Gly Glu  Met Gln Phe Gly Tyr  Ile Asn Ile Glu Asp  Lys Met Phe
    2270                2275                2280

Tyr Phe  Gly Glu Asp Gly Val  Met Gln Ile Gly Val  Phe Asn Thr
    2285                2290                2295
```

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Pro Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu
2300 2305 2310

Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu
2315 2320 2325

Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr
2330 2335 2340

Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp
2345 2350 2355

Thr Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 112
<211> 2366
<212> PRT
<213> Clostridium difficile

<400> 112

Met Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg
1 5 10 15

Phe Arg Val Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
20 25 30

Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
35 40 45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
50 55 60

Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65 70 75 80

Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys
85 90 95

Asn Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile

100 105 110

Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
115 120 125

Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
130 135 140

Ile Val Glu Ser Ala Thr Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145 150 155 160

Leu Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Tyr Arg Lys Arg Met
165 170 175

Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Thr
180 185 190

Gln Arg Glu Glu Asn Pro Asp Leu Ile Ile Asp Asp Ile Val Lys Ile
195 200 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Asp Ile Asp Glu Leu Asn Ser Tyr
210 215 220

Ile Glu Glu Ser Leu Asn Lys Val Thr Glu Asn Ser Gly Asn Asp Val
225 230 235 240

Arg Asn Phe Glu Glu Phe Lys Gly Gly Glu Ser Phe Lys Leu Tyr Glu
245 250 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu
260 265 270

Arg Ile Ser Ala Leu Lys Glu Val Gly Gly Val Tyr Leu Asp Val Asp
275 280 285

Met Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro
290 295 300

Ser Ser Val Thr Val Asp Phe Trp Glu Met Val Lys Leu Glu Ala Ile

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305                 310                 315                 320

Met Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp
                325                 330                 335

Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
            340                 345                 350

Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala
        355                 360                 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn
    370                 375                 380

Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val
385                 390                 395                 400

Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro
                405                 410                 415

Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Ala Phe Ile
            420                 425                 430

Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met
        435                 440                 445

Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr
    450                 455                 460

Thr Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp
465                 470                 475                 480

Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala
                485                 490                 495

Asp Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr
            500                 505                 510

Glu Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys
```

515 520 525

Ala Gln Phe Glu Glu Tyr Lys Lys Asn Tyr Phe Glu Gly Ser Leu Gly
530 535 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Thr Val Val Asp Lys Glu
545 550 555 560

Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly
565 570 575

Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
580 585 590

Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe
595 600 605

Gln Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly
610 615 620

Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile
625 630 635 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp
645 650 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser
660 665 670

Thr Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro
675 680 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser
690 695 700

Val Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Arg Val Lys
705 710 715 720

Asp Lys Val Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile

```
                725                 730                 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg
            740                 745                 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
        755                 760                 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
    770                 775                 780

Asn Lys Ile Ile Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785                 790                 795                 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu
                805                 810                 815

Glu Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
            820                 825                 830

Asp Thr Gln Val Val Glu Gly Arg Ile Glu Glu Ala Lys Ser Leu Thr
        835                 840                 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser
    850                 855                 860

Ile Ser Asp Ala Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Glu Glu
865                 870                 875                 880

Ser His Phe Ile Ser Phe Glu Asp Ile Leu Glu Thr Asp Glu Gly Phe
                885                 890                 895

Ser Ile Arg Phe Ile Asp Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
            900                 905                 910

Thr Glu Lys Ala Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu
        915                 920                 925

Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
```

930 935 940

Val Lys Lys Val Asn Leu Asp Ala Thr His Glu Val Asn Thr Leu Asn
945 950 955 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu
965 970 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
980 985 990

Leu Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp Ala Ala Lys Val Val
995 1000 1005

Glu Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu Pro
1010 1015 1020

Thr Leu Ser Glu Gly Leu Pro Val Ile Ala Thr Ile Ile Asp Gly
1025 1030 1035

Val Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp
1040 1045 1050

Pro Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala
1055 1060 1065

Val Asn Leu Thr Ala Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu
1070 1075 1080

Gly Ile Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly
1085 1090 1095

Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile Leu
1100 1105 1110

Arg Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Ser His Ile Ser
1115 1120 1125

Leu Ala Glu Ser Glu Gly Ala Phe Thr Ser Leu Asp Asp Lys Ile

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    1130                1135                1140

Met Met  Pro Gln Asp Asp Leu  Val Ile Ser Glu Ile  Asp Phe Asn
    1145                1150                1155

Asn Asn  Ser Ile Thr Leu Gly  Lys Cys Glu Ile Trp  Arg Met Glu
    1160                1165                1170

Gly Gly  Ser Gly His Thr Val  Thr Asp Asp Ile Asp  His Phe Phe
    1175                1180                1185

Ser Ala  Pro Ser Ile Thr Tyr  Arg Glu Pro His Leu  Ser Ile Tyr
    1190                1195                1200

Asp Val  Leu Glu Val Gln Lys  Glu Glu Leu Asp Leu  Ser Lys Asp
    1205                1210                1215

Leu Met  Val Leu Pro Asn Ala  Pro Asn Arg Val Phe  Ala Trp Glu
    1220                1225                1230

Thr Gly  Trp Thr Pro Gly Leu  Arg Ser Leu Glu Asn  Asp Gly Thr
    1235                1240                1245

Lys Leu  Leu Asp Arg Ile Arg  Asp Asn Tyr Glu Gly  Glu Phe Tyr
    1250                1255                1260

Trp Arg  Tyr Phe Ala Phe Ile  Ala Asp Ala Leu Ile  Thr Thr Leu
    1265                1270                1275

Lys Pro  Arg Tyr Glu Asp Thr  Asn Ile Arg Ile Asn  Leu Asp Ser
    1280                1285                1290

Asn Thr  Arg Ser Phe Ile Val  Pro Val Ile Thr Thr  Glu Tyr Ile
    1295                1300                1305

Arg Glu  Lys Leu Ser Tyr Ser  Phe Tyr Gly Ser Gly  Gly Thr Tyr
    1310                1315                1320

Ala Leu  Ser Leu Ser Gln Tyr  Asn Met Asn Ile Asn  Ile Glu Leu
```

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1325 1330 1335

Asn Glu Asn Asp Thr Trp Val Ile Asp Val Asp Asn Val Val Arg
1340 1345 1350

Asp Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile
1355 1360 1365

Glu Asn Ile Leu Ser Lys Leu Ser Ile Glu Asp Asn Lys Ile Ile
1370 1375 1380

Leu Asp Asn His Glu Ile Asn Phe Ser Gly Thr Leu Asn Gly Gly
1385 1390 1395

Asn Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn
1400 1405 1410

Ala Val Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Val Leu
1415 1420 1425

Ile Ser Gly Glu Leu Lys Thr Leu Met Ala Asn Ser Asn Ser Val
1430 1435 1440

Gln Gln Lys Ile Asp Tyr Ile Gly Leu Asn Ser Glu Leu Gln Lys
1445 1450 1455

Asn Ile Pro Tyr Ser Phe Met Asp Asp Lys Gly Lys Glu Asn Gly
1460 1465 1470

Phe Ile Asn Cys Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu
1475 1480 1485

Ser Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asn Ser Lys
1490 1495 1500

Pro Leu Phe Gly Tyr Cys Ser Asn Asp Leu Lys Asp Val Lys Val
1505 1510 1515

Ile Thr Lys Asp Asp Val Ile Ile Leu Thr Gly Tyr Tyr Leu Lys

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1520 1525 1530

Asp Asp Ile Lys Ile Ser Leu Ser Phe Thr Ile Gln Asp Glu Asn
1535 1540 1545

Thr Ile Lys Leu Asn Gly Val Tyr Leu Asp Glu Asn Gly Val Ala
1550 1555 1560

Glu Ile Leu Lys Phe Met Asn Lys Lys Gly Ser Thr Asn Thr Ser
1565 1570 1575

Asp Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile
1580 1585 1590

Phe Ile Asn Ser Leu Gln Ser Asn Thr Lys Leu Ile Leu Asp Thr
1595 1600 1605

Asn Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe
1610 1615 1620

Ile Cys Asp Lys Asp Asn Asn Ile Gln Pro Tyr Phe Ile Lys Phe
1625 1630 1635

Asn Thr Leu Glu Thr Lys Tyr Thr Leu Tyr Val Gly Asn Arg Gln
1640 1645 1650

Asn Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp
1655 1660 1665

Ile Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly
1670 1675 1680

Ile Asp Ser Cys Val Asn Lys Val Ile Ile Ser Pro Asn Ile Tyr
1685 1690 1695

Thr Asp Glu Ile Asn Ile Thr Pro Ile Tyr Glu Ala Asn Asn Thr
1700 1705 1710

Tyr Pro Glu Val Ile Val Leu Asp Thr Asn Tyr Ile Ser Glu Lys

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1715 1720 1725

Ile Asn Ile Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser
1730 1735 1740

Asn Asp Gly Ser Asp Phe Ile Leu Met Ser Thr Asp Glu Glu Asn
1745 1750 1755

Lys Val Ser Gln Val Lys Ile Arg Phe Thr Asn Val Phe Lys Gly
1760 1765 1770

Asn Thr Ile Ser Asp Lys Ile Ser Phe Asn Phe Ser Asp Lys Gln
1775 1780 1785

Asp Val Ser Ile Asn Lys Val Ile Ser Thr Phe Thr Pro Ser Tyr
1790 1795 1800

Tyr Val Glu Gly Leu Leu Asn Tyr Asp Leu Gly Leu Ile Ser Leu
1805 1810 1815

Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser
1820 1825 1830

Gly Leu Val Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro
1835 1840 1845

Ile Lys Asn Leu Ile Thr Gly Phe Thr Thr Ile Gly Asp Asp Lys
1850 1855 1860

Tyr Tyr Phe Asn Pro Asp Asn Gly Gly Ala Ala Ser Val Gly Glu
1865 1870 1875

Thr Ile Ile Asp Gly Lys Asn Tyr Tyr Phe Ser Gln Asn Gly Val
1880 1885 1890

Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
1895 1900 1905

Ala Pro Ala Asp Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile

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1910 1915 1920

Asp Phe Thr Gly Lys Leu Thr Ile Asp Glu Asn Val Tyr Tyr Phe
1925 1930 1935

Gly Asp Asn Tyr Arg Ala Ala Ile Glu Trp Gln Thr Leu Asp Asp
1940 1945 1950

Glu Val Tyr Tyr Phe Ser Thr Asp Thr Gly Arg Ala Phe Lys Gly
1955 1960 1965

Leu Asn Gln Ile Gly Asp Asp Lys Phe Tyr Phe Asn Ser Asp Gly
1970 1975 1980

Ile Met Gln Lys Gly Phe Val Asn Ile Asn Asp Lys Thr Phe Tyr
1985 1990 1995

Phe Asp Asp Ser Gly Val Met Lys Ser Gly Tyr Thr Glu Ile Asp
2000 2005 2010

Gly Lys Tyr Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly
2015 2020 2025

Val Phe Asn Thr Ala Asp Gly Phe Lys Tyr Phe Ala His His Asp
2030 2035 2040

Glu Asp Leu Gly Asn Glu Glu Gly Glu Ala Leu Ser Tyr Ser Gly
2045 2050 2055

Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe
2060 2065 2070

Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr
2075 2080 2085

Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Ile Ser Ile
2090 2095 2100

Ile Asn Asp Gly Lys Tyr Tyr Phe Asn Asp Ser Gly Ile Met Gln

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2105 2110 2115

Ile Gly Phe Val Thr Ile Asn Asn Glu Val Phe Tyr Phe Ser Asp
2120 2125 2130

Ser Gly Ile Val Glu Ser Gly Met Gln Asn Ile Asp Asp Asn Tyr
2135 2140 2145

Phe Tyr Ile Asp Glu Asn Gly Leu Val Gln Ile Gly Val Phe Asp
2150 2155 2160

Thr Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn
2165 2170 2175

Asp Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg
2180 2185 2190

Val Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu
2195 2200 2205

Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr
2210 2215 2220

Phe Asp Pro Glu Thr Lys Lys Ala Tyr Lys Gly Ile Asn Val Ile
2225 2230 2235

Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Asn Gly Ile Met Arg Thr
2240 2245 2250

Gly Leu Ile Thr Phe Glu Asp Asn His Tyr Tyr Phe Asn Glu Asp
2255 2260 2265

Gly Ile Met Gln Tyr Gly Tyr Leu Asn Ile Glu Asp Lys Thr Phe
2270 2275 2280

Tyr Phe Ser Glu Asp Gly Ile Met Gln Ile Gly Val Phe Asn Thr
2285 2290 2295

Pro Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu

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2300 2305 2310

Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu
2315 2320 2325

Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr
2330 2335 2340

Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp
2345 2350 2355

Thr Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 113
<211> 2366
<212> PRT
<213> Clostridium difficile

<400> 113

Met Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg
1 5 10 15

Phe Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
20 25 30

Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
35 40 45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
50 55 60

Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65 70 75 80

Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys
85 90 95

Asn Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
100 105 110

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```
Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
        115                 120                 125

Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
    130                 135                 140

Val Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145                 150                 155                 160

Leu Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met
                165                 170                 175

Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala
            180                 185                 190

Gln Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr
        195                 200                 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr
    210                 215                 220

Ile Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val
225                 230                 235                 240

Arg Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu
                245                 250                 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu
            260                 265                 270

Arg Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp
        275                 280                 285

Met Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro
    290                 295                 300

Ser Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile
305                 310                 315                 320
```

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```
Met Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp
                325                 330                 335

Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
            340                 345                 350

Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala
        355                 360                 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn
    370                 375                 380

Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val
385                 390                 395                 400

Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro
                405                 410                 415

Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile
            420                 425                 430

Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met
        435                 440                 445

Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr
    450                 455                 460

Thr Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp
465                 470                 475                 480

Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala
                485                 490                 495

Asp Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr
            500                 505                 510

Glu Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys
        515                 520                 525
```

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```
Ala Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly
    530                 535                 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu
545                 550                 555                 560

Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly
                565                 570                 575

Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
            580                 585                 590

Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe
        595                 600                 605

Gln Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly
    610                 615                 620

Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile
625                 630                 635                 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp
                645                 650                 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser
            660                 665                 670

Thr Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro
        675                 680                 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser
    690                 695                 700

Ile Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys
705                 710                 715                 720

Asp Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
                725                 730                 735
```

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```
Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg
            740                 745                 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
        755                 760                 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
    770                 775                 780

Asn Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785                 790                 795                 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu
                805                 810                 815

Glu Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
            820                 825                 830

Asp Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr
        835                 840                 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser
    850                 855                 860

Ile Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp
865                 870                 875                 880

Ser His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe
                885                 890                 895

Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
            900                 905                 910

Thr Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu
        915                 920                 925

Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
    930                 935                 940
```

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```
Val Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn
945                 950                 955                 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu
                965                 970                 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
            980                 985                 990

Leu Phe Ser Thr Gly Leu Asn Thr  Ile Thr Asp Ala Ala  Lys Val Val
        995                 1000                1005

Glu Leu  Val Ser Thr Ala Leu  Asp Glu Thr Ile Asp  Leu Leu Pro
    1010                1015                1020

Thr Leu  Ser Glu Gly Leu Pro  Ile Ile Ala Thr Ile  Ile Asp Gly
    1025                1030                1035

Val Ser  Leu Gly Ala Ala Ile  Lys Glu Leu Ser Glu  Thr Ser Asp
    1040                1045                1050

Pro Leu  Leu Arg Gln Glu Ile  Glu Ala Lys Ile Gly  Ile Met Ala
    1055                1060                1065

Val Asn  Leu Thr Thr Ala Thr  Thr Ala Ile Ile Thr  Ser Ser Leu
    1070                1075                1080

Gly Val  Ala Ser Gly Phe Ser  Ile Leu Leu Val Pro  Leu Ala Gly
    1085                1090                1095

Ile Ser  Ala Gly Ile Pro Ser  Leu Val Asn Asn Glu  Leu Val Leu
    1100                1105                1110

Arg Asp  Lys Ala Thr Lys Val  Val Asp Tyr Phe Lys  His Val Ser
    1115                1120                1125

Leu Val  Glu Thr Glu Gly Val  Phe Thr Leu Leu Asp  Asp Lys Ile
    1130                1135                1140
```

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```
Met Met  Pro Gln Asp Asp Leu  Val Ile Ser Glu Ile  Asp Phe Asn
    1145                1150                1155

Asn Asn  Ser Ile Val Leu Gly  Lys Cys Glu Ile Trp  Arg Met Glu
    1160                1165                1170

Gly Gly  Ser Gly His Thr Val  Thr Asp Asp Ile Asp  His Phe Phe
    1175                1180                1185

Ser Ala  Pro Ser Ile Thr Tyr  Arg Glu Pro His Leu  Ser Ile Tyr
    1190                1195                1200

Asp Val  Leu Glu Val Gln Lys  Glu Glu Leu Asp Leu  Ser Lys Asp
    1205                1210                1215

Leu Met  Val Leu Pro Asn Ala  Pro Asn Arg Val Phe  Ala Trp Glu
    1220                1225                1230

Thr Gly  Trp Thr Pro Gly Leu  Arg Ser Leu Glu Asn  Asp Gly Thr
    1235                1240                1245

Lys Leu  Leu Asp Arg Ile Arg  Asp Asn Tyr Glu Gly  Glu Phe Tyr
    1250                1255                1260

Trp Arg  Tyr Phe Ala Phe Ile  Ala Asp Ala Leu Ile  Thr Thr Leu
    1265                1270                1275

Lys Pro  Arg Tyr Glu Asp Thr  Asn Ile Arg Ile Asn  Leu Asp Ser
    1280                1285                1290

Asn Thr  Arg Ser Phe Ile Val  Pro Ile Ile Thr Thr  Glu Tyr Ile
    1295                1300                1305

Arg Glu  Lys Leu Ser Tyr Ser  Phe Tyr Gly Ser Gly  Gly Thr Tyr
    1310                1315                1320

Ala Leu  Ser Leu Ser Gln Tyr  Asn Met Gly Ile Asn  Ile Glu Leu
    1325                1330                1335
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Ser Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg
1340 1345 1350

Asp Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile
1355 1360 1365

Glu Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile
1370 1375 1380

Leu Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser
1385 1390 1395

Asn Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn
1400 1405 1410

Ala Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu
1415 1420 1425

Ile Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile
1430 1435 1440

Gln Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys
1445 1450 1455

Asn Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly
1460 1465 1470

Phe Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu
1475 1480 1485

Pro Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys
1490 1495 1500

Pro Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val
1505 1510 1515

Ile Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys
1520 1525 1530

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```
Asp Asp  Ile Lys Ile Ser Leu  Ser Leu Thr Leu Gln  Asp Glu Lys
    1535                1540                1545

Thr Ile  Lys Leu Asn Ser Val  His Leu Asp Glu Ser  Gly Val Ala
    1550                1555                1560

Glu Ile  Leu Lys Phe Met Asn  Arg Lys Gly Asn Thr  Asn Thr Ser
    1565                1570                1575

Asp Ser  Leu Met Ser Phe Leu  Glu Ser Met Asn Ile  Lys Ser Ile
    1580                1585                1590

Phe Val  Asn Phe Leu Gln Ser  Asn Ile Lys Phe Ile  Leu Asp Ala
    1595                1600                1605

Asn Phe  Ile Ile Ser Gly Thr  Thr Ser Ile Gly Gln  Phe Glu Phe
    1610                1615                1620

Ile Cys  Asp Glu Asn Asp Asn  Ile Gln Pro Tyr Phe  Ile Lys Phe
    1625                1630                1635

Asn Thr  Leu Glu Thr Asn Tyr  Thr Leu Tyr Val Gly  Asn Arg Gln
    1640                1645                1650

Asn Met  Ile Val Glu Pro Asn  Tyr Asp Leu Asp Asp  Ser Gly Asp
    1655                1660                1665

Ile Ser  Ser Thr Val Ile Asn  Phe Ser Gln Lys Tyr  Leu Tyr Gly
    1670                1675                1680

Ile Asp  Ser Cys Val Asn Lys  Val Val Ile Ser Pro  Asn Ile Tyr
    1685                1690                1695

Thr Asp  Glu Ile Asn Ile Thr  Pro Val Tyr Glu Thr  Asn Asn Thr
    1700                1705                1710

Tyr Pro  Glu Val Ile Val Leu  Asp Ala Asn Tyr Ile  Asn Glu Lys
    1715                1720                1725
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```
Ile Asn  Val Asn Ile Asn Asp  Leu Ser Ile Arg Tyr  Val Trp Ser
    1730                1735                1740

Asn Asp  Gly Asn Asp Phe Ile  Leu Met Ser Thr Ser  Glu Glu Asn
    1745                1750                1755

Lys Val  Ser Gln Val Lys Ile  Arg Phe Val Asn Val  Phe Lys Asp
    1760                1765                1770

Lys Thr  Leu Ala Asn Lys Leu  Ser Phe Asn Phe Ser  Asp Lys Gln
    1775                1780                1785

Asp Val  Pro Val Ser Glu Ile  Ile Leu Ser Phe Thr  Pro Ser Tyr
    1790                1795                1800

Tyr Glu  Asp Gly Leu Ile Gly  Tyr Asp Leu Gly Leu  Val Ser Leu
    1805                1810                1815

Tyr Asn  Glu Lys Phe Tyr Ile  Asn Asn Phe Gly Met  Met Val Ser
    1820                1825                1830

Gly Leu  Ile Tyr Ile Asn Asp  Ser Leu Tyr Tyr Phe  Lys Pro Pro
    1835                1840                1845

Val Asn  Asn Leu Ile Thr Gly  Phe Val Thr Val Gly  Asp Asp Lys
    1850                1855                1860

Tyr Tyr  Phe Asn Pro Ile Asn  Gly Gly Ala Ala Ser  Ile Gly Glu
    1865                1870                1875

Thr Ile  Ile Asp Asp Lys Asn  Tyr Tyr Phe Asn Gln  Ser Gly Val
    1880                1885                1890

Leu Gln  Thr Gly Val Phe Ser  Thr Glu Asp Gly Phe  Lys Tyr Phe
    1895                1900                1905

Ala Pro  Ala Asn Thr Leu Asp  Glu Asn Leu Glu Gly  Glu Ala Ile
    1910                1915                1920
```

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```
Asp Phe  Thr Gly Lys Leu Ile  Ile Asp Glu Asn Ile  Tyr Tyr Phe
    1925                1930                1935

Asp Asp  Asn Tyr Arg Gly Ala  Val Glu Trp Lys Glu  Leu Asp Gly
    1940                1945                1950

Glu Met  His Tyr Phe Ser Pro  Glu Thr Gly Lys Ala  Phe Lys Gly
    1955                1960                1965

Leu Asn  Gln Ile Gly Asp Tyr  Lys Tyr Tyr Phe Asn  Ser Asp Gly
    1970                1975                1980

Val Met  Gln Lys Gly Phe Val  Ser Ile Asn Asp Asn  Lys His Tyr
    1985                1990                1995

Phe Asp  Asp Ser Gly Val Met  Lys Val Gly Tyr Thr  Glu Ile Asp
    2000                2005                2010

Gly Lys  His Phe Tyr Phe Ala  Glu Asn Gly Glu Met  Gln Ile Gly
    2015                2020                2025

Val Phe  Asn Thr Glu Asp Gly  Phe Lys Tyr Phe Ala  His His Asn
    2030                2035                2040

Glu Asp  Leu Gly Asn Glu Glu  Gly Glu Glu Ile Ser  Tyr Ser Gly
    2045                2050                2055

Ile Leu  Asn Phe Asn Asn Lys  Ile Tyr Tyr Phe Asp  Asp Ser Phe
    2060                2065                2070

Thr Ala  Val Val Gly Trp Lys  Asp Leu Glu Asp Gly  Ser Lys Tyr
    2075                2080                2085

Tyr Phe  Asp Glu Asp Thr Ala  Glu Ala Tyr Ile Gly  Leu Ser Leu
    2090                2095                2100

Ile Asn  Asp Gly Gln Tyr Tyr  Phe Asn Asp Asp Gly  Ile Met Gln
    2105                2110                2115
```

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```
Val Gly  Phe Val Thr Ile Asn  Asp Lys Val Phe Tyr  Phe Ser Asp
    2120                2125                2130

Ser Gly  Ile Ile Glu Ser Gly  Val Gln Asn Ile Asp  Asp Asn Tyr
    2135                2140                2145

Phe Tyr  Ile Asp Asp Asn Gly  Ile Val Gln Ile Gly  Val Phe Asp
    2150                2155                2160

Thr Ser  Asp Gly Tyr Lys Tyr  Phe Ala Pro Ala Asn  Thr Val Asn
    2165                2170                2175

Asp Asn  Ile Tyr Gly Gln Ala  Val Glu Tyr Ser Gly  Leu Val Arg
    2180                2185                2190

Val Gly  Glu Asp Val Tyr Tyr  Phe Gly Glu Thr Tyr  Thr Ile Glu
    2195                2200                2205

Thr Gly  Trp Ile Tyr Asp Met  Glu Asn Glu Ser Asp  Lys Tyr Tyr
    2210                2215                2220

Phe Asn  Pro Glu Thr Lys Lys  Ala Cys Lys Gly Ile  Asn Leu Ile
    2225                2230                2235

Asp Asp  Ile Lys Tyr Tyr Phe  Asp Glu Lys Gly Ile  Met Arg Thr
    2240                2245                2250

Gly Leu  Ile Ser Phe Glu Asn  Asn Asn Tyr Tyr Phe  Asn Glu Asn
    2255                2260                2265

Gly Glu  Met Gln Phe Gly Tyr  Ile Asn Ile Glu Asp  Lys Met Phe
    2270                2275                2280

Tyr Phe  Gly Glu Asp Gly Val  Met Gln Ile Gly Val  Phe Asn Thr
    2285                2290                2295

Pro Asp  Gly Phe Lys Tyr Phe  Ala His Gln Asn Thr  Leu Asp Glu
    2300                2305                2310
```

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Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu
2315 2320 2325

Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr
2330 2335 2340

Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp
2345 2350 2355

Thr Ala Gln Leu Val Ile Ser Glu
2360 2365

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<211> 2366
<212> PRT
<213> Clostridium difficile

<400> 114

Met Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg
1 5 10 15

Phe Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
20 25 30

Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
35 40 45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
50 55 60

Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65 70 75 80

Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys
85 90 95

Asn Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
100 105 110

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```
Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
        115                 120                 125

Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
    130                 135                 140

Val Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145                 150                 155                 160

Leu Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met
                165                 170                 175

Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala
            180                 185                 190

Gln Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr
        195                 200                 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr
    210                 215                 220

Ile Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val
225                 230                 235                 240

Arg Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu
                245                 250                 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu
            260                 265                 270

Arg Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp
        275                 280                 285

Met Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro
    290                 295                 300

Ser Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile
305                 310                 315                 320
```

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```
Met Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp
                325                 330                 335

Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
            340                 345                 350

Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala
        355                 360                 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn
    370                 375                 380

Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val
385                 390                 395                 400

Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro
                405                 410                 415

Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile
            420                 425                 430

Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met
        435                 440                 445

Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr
    450                 455                 460

Thr Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp
465                 470                 475                 480

Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala
                485                 490                 495

Asp Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr
            500                 505                 510

Glu Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys
        515                 520                 525
```

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```
Ala Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly
    530                 535                 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu
545                 550                 555                 560

Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly
                565                 570                 575

Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
            580                 585                 590

Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe
        595                 600                 605

Gln Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly
    610                 615                 620

Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile
625                 630                 635                 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp
                645                 650                 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser
            660                 665                 670

Thr Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro
        675                 680                 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser
    690                 695                 700

Ile Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys
705                 710                 715                 720

Asp Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
                725                 730                 735
```

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```
Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg
            740                 745                 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
        755                 760                 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
    770                 775                 780

Asn Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785                 790                 795                 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu
                805                 810                 815

Glu Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
            820                 825                 830

Asp Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr
        835                 840                 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser
    850                 855                 860

Ile Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp
865                 870                 875                 880

Ser His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe
                885                 890                 895

Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
            900                 905                 910

Thr Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu
        915                 920                 925

Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
    930                 935                 940
```

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```
Val Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn
945                 950                 955                 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu
                965                 970                 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
            980                 985                 990

Leu Phe Ser Thr Gly Leu Asn Thr  Ile Thr Asp Ala Ala  Lys Val Val
        995                 1000                1005

Glu Leu  Val Ser Thr Ala Leu  Asp Glu Thr Ile Asp  Leu Leu Pro
    1010                1015                1020

Thr Leu  Ser Glu Gly Leu Pro  Ile Ile Ala Thr Ile  Ile Asp Gly
    1025                1030                1035

Val Ser  Leu Gly Ala Ala Ile  Lys Glu Leu Ser Glu  Thr Ser Asp
    1040                1045                1050

Pro Leu  Leu Arg Gln Glu Ile  Glu Ala Lys Ile Gly  Ile Met Ala
    1055                1060                1065

Val Asn  Leu Thr Thr Ala Thr  Thr Ala Ile Ile Thr  Ser Ser Leu
    1070                1075                1080

Gly Ile  Ala Ser Gly Phe Ser  Ile Leu Leu Val Pro  Leu Ala Gly
    1085                1090                1095

Ile Ser  Ala Gly Ile Pro Ser  Leu Val Asn Asn Glu  Leu Val Leu
    1100                1105                1110

Arg Asp  Lys Ala Thr Lys Val  Val Asp Tyr Phe Lys  His Val Ser
    1115                1120                1125

Leu Val  Glu Thr Glu Gly Val  Phe Thr Leu Leu Asp  Asp Lys Ile
    1130                1135                1140
```

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```
Met Met  Pro Gln Asp Asp Leu  Val Ile Ser Glu Ile  Asp Phe Asn
    1145                1150                1155

Asn Asn  Ser Ile Val Leu Gly  Lys Cys Glu Ile Trp  Arg Met Glu
    1160                1165                1170

Gly Gly  Ser Gly His Thr Val  Thr Asp Asp Ile Asp  His Phe Phe
    1175                1180                1185

Ser Ala  Pro Ser Ile Thr Tyr  Arg Glu Pro His Leu  Ser Ile Tyr
    1190                1195                1200

Asp Val  Leu Glu Val Gln Lys  Glu Glu Leu Asp Leu  Ser Lys Asp
    1205                1210                1215

Leu Met  Val Leu Pro Asn Ala  Pro Asn Arg Val Phe  Ala Trp Glu
    1220                1225                1230

Thr Gly  Trp Thr Pro Gly Leu  Arg Ser Leu Glu Asn  Asp Gly Thr
    1235                1240                1245

Lys Leu  Leu Asp Arg Ile Arg  Asp Asn Tyr Glu Gly  Glu Phe Tyr
    1250                1255                1260

Trp Arg  Tyr Phe Ala Phe Ile  Ala Asp Ala Leu Ile  Thr Thr Leu
    1265                1270                1275

Lys Pro  Arg Tyr Glu Asp Thr  Asn Ile Arg Ile Asn  Leu Asp Ser
    1280                1285                1290

Asn Thr  Arg Ser Phe Ile Val  Pro Ile Ile Thr Thr  Glu Tyr Ile
    1295                1300                1305

Arg Glu  Lys Leu Ser Tyr Ser  Phe Tyr Gly Ser Gly  Gly Thr Tyr
    1310                1315                1320

Ala Leu  Ser Leu Ser Gln Tyr  Asn Met Gly Ile Asn  Ile Glu Leu
    1325                1330                1335
```

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```
Ser Glu  Ser Asp Val Trp Ile  Ile Asp Val Asp Asn  Val Val Arg
    1340                1345                1350

Asp Val  Thr Ile Glu Ser Asp  Lys Ile Lys Lys Gly  Asp Leu Ile
    1355                1360                1365

Glu Gly  Ile Leu Ser Thr Leu  Ser Ile Glu Glu Asn  Lys Ile Ile
    1370                1375                1380

Leu Asn  Ser His Glu Ile Asn  Phe Ser Gly Glu Val  Asn Gly Ser
    1385                1390                1395

Asn Gly  Phe Val Ser Leu Thr  Phe Ser Ile Leu Glu  Gly Ile Asn
    1400                1405                1410

Ala Ile  Ile Glu Val Asp Leu  Leu Ser Lys Ser Tyr  Lys Leu Leu
    1415                1420                1425

Ile Ser  Gly Glu Leu Lys Ile  Leu Met Leu Asn Ser  Asn His Ile
    1430                1435                1440

Gln Gln  Lys Ile Asp Tyr Ile  Gly Phe Asn Ser Glu  Leu Gln Lys
    1445                1450                1455

Asn Ile  Pro Tyr Arg Phe Val  Asp Ser Glu Gly Lys  Glu Asn Gly
    1460                1465                1470

Phe Ile  Asn Gly Ser Thr Lys  Glu Gly Leu Phe Val  Ser Glu Leu
    1475                1480                1485

Pro Asp  Val Val Leu Ile Ser  Lys Val Tyr Met Asp  Asp Ser Lys
    1490                1495                1500

Pro Ser  Phe Gly Tyr Tyr Ser  Asn Asn Leu Lys Asp  Val Lys Val
    1505                1510                1515

Ile Thr  Lys Asp Asn Val Asn  Ile Leu Thr Gly Tyr  Tyr Leu Lys
    1520                1525                1530
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Asp Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys
1535 1540 1545

Thr Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala
1550 1555 1560

Glu Ile Leu Lys Phe Met Asn Arg Lys Gly Asn Thr Asn Thr Ser
1565 1570 1575

Asp Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile
1580 1585 1590

Phe Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala
1595 1600 1605

Asn Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe
1610 1615 1620

Ile Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe
1625 1630 1635

Asn Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln
1640 1645 1650

Asn Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp
1655 1660 1665

Ile Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly
1670 1675 1680

Ile Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr
1685 1690 1695

Thr Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr
1700 1705 1710

Tyr Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys
1715 1720 1725

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Ile Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser
1730 1735 1740

Asn Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn
1745 1750 1755

Lys Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp
1760 1765 1770

Lys Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln
1775 1780 1785

Asp Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr
1790 1795 1800

Tyr Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu
1805 1810 1815

Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser
1820 1825 1830

Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro
1835 1840 1845

Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys
1850 1855 1860

Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu
1865 1870 1875

Thr Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val
1880 1885 1890

Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
1895 1900 1905

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile
1910 1915 1920

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Asp Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe
1925 1930 1935

Asp Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly
1940 1945 1950

Glu Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly
1955 1960 1965

Leu Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly
1970 1975 1980

Val Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr
1985 1990 1995

Phe Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp
2000 2005 2010

Gly Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly
2015 2020 2025

Val Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn
2030 2035 2040

Glu Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly
2045 2050 2055

Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe
2060 2065 2070

Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr
2075 2080 2085

Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu
2090 2095 2100

Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln
2105 2110 2115

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Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp
2120 2125 2130

Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
2135 2140 2145

Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp
2150 2155 2160

Thr Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn
2165 2170 2175

Asp Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg
2180 2185 2190

Val Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu
2195 2200 2205

Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile
2225 2230 2235

Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr
2240 2245 2250

Gly Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn
2255 2260 2265

Gly Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe
2270 2275 2280

Tyr Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr
2285 2290 2295

Pro Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu
2300 2305 2310

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Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu
2315 2320 2325

Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr
2330 2335 2340

Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp
2345 2350 2355

Thr Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 115
<211> 2366
<212> PRT
<213> Clostridium difficile

<400> 115

Met Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg
1 5 10 15

Phe Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
20 25 30

Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
35 40 45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
50 55 60

Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65 70 75 80

Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys
85 90 95

Asn Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
100 105 110

```
Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
        115                 120                 125

Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
    130                 135                 140

Val Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145                 150                 155                 160

Leu Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met
                165                 170                 175

Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala
            180                 185                 190

Gln Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr
        195                 200                 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr
    210                 215                 220

Ile Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val
225                 230                 235                 240

Arg Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu
                245                 250                 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu
            260                 265                 270

Arg Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp
        275                 280                 285

Met Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro
    290                 295                 300

Ser Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile
305                 310                 315                 320
```

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```
Met Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp
                325                 330                 335

Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
            340                 345                 350

Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala
        355                 360                 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn
    370                 375                 380

Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val
385                 390                 395                 400

Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro
                405                 410                 415

Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile
            420                 425                 430

Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met
        435                 440                 445

Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr
    450                 455                 460

Thr Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp
465                 470                 475                 480

Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala
                485                 490                 495

Asp Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr
            500                 505                 510

Glu Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys
        515                 520                 525
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Ala Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly
    530                 535                 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu
545                 550                 555                 560

Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly
                565                 570                 575

Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
            580                 585                 590

Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe
        595                 600                 605

Gln Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly
    610                 615                 620

Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile
625                 630                 635                 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp
                645                 650                 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser
            660                 665                 670

Thr Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro
        675                 680                 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser
    690                 695                 700

Ile Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys
705                 710                 715                 720

Asp Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
                725                 730                 735
```

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```
Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg
            740                 745                 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
        755                 760                 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
    770                 775                 780

Asn Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785                 790                 795                 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu
                805                 810                 815

Glu Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
            820                 825                 830

Asp Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr
        835                 840                 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser
    850                 855                 860

Ile Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp
865                 870                 875                 880

Ser His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe
                885                 890                 895

Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
            900                 905                 910

Thr Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu
        915                 920                 925

Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
    930                 935                 940
```

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```
Val Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn
945                 950                 955                 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu
                965                 970                 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
            980                 985                 990

Leu Phe Ser Thr Gly Leu Asn Thr  Ile Thr Asp Ala Ala  Lys Val Val
        995                 1000                1005

Glu Leu  Val Ser Thr Ala Leu  Asp Glu Thr Ile Asp  Leu Leu Pro
    1010                1015                1020

Thr Leu  Ser Glu Gly Leu Pro  Ile Ile Ala Thr Ile  Ile Asp Gly
    1025                1030                1035

Val Ser  Leu Gly Ala Ala Ile  Lys Glu Leu Ser Glu  Thr Ser Asp
    1040                1045                1050

Pro Leu  Leu Arg Gln Glu Ile  Glu Ala Lys Ile Gly  Ile Met Ala
    1055                1060                1065

Val Asn  Leu Thr Thr Ala Thr  Thr Ala Ile Ile Thr  Ser Ser Leu
    1070                1075                1080

Gly Ile  Ala Ser Gly Phe Ser  Ile Leu Leu Val Pro  Leu Ala Gly
    1085                1090                1095

Ile Ser  Ala Gly Ile Pro Ser  Leu Val Asn Asn Glu  Leu Val Leu
    1100                1105                1110

Arg Asp  Lys Ala Thr Lys Val  Val Asp Tyr Phe Lys  His Val Ser
    1115                1120                1125

Leu Val  Glu Thr Glu Gly Val  Phe Thr Leu Leu Asp  Asp Lys Ile
    1130                1135                1140
```

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```
Met Met  Pro Gln Asp Asp Leu  Val Ile Ser Glu Ile  Asp Phe Asn
    1145                1150                1155

Asn Asn  Ser Ile Val Leu Gly  Lys Cys Glu Ile Trp  Arg Met Glu
    1160                1165                1170

Gly Gly  Ser Gly His Thr Val  Thr Asp Asp Ile Asp  His Phe Phe
    1175                1180                1185

Ser Ala  Pro Ser Ile Thr Tyr  Arg Glu Pro His Leu  Ser Ile Tyr
    1190                1195                1200

Asp Val  Leu Glu Val Gln Lys  Glu Glu Leu Asp Leu  Ser Lys Asp
    1205                1210                1215

Leu Met  Val Leu Pro Asn Ala  Pro Asn Arg Val Phe  Ala Trp Glu
    1220                1225                1230

Thr Gly  Trp Thr Pro Gly Leu  Arg Ser Leu Glu Asn  Asp Gly Thr
    1235                1240                1245

Lys Leu  Leu Asp Arg Ile Arg  Asp Asn Tyr Glu Gly  Glu Phe Tyr
    1250                1255                1260

Trp Arg  Tyr Phe Ala Phe Ile  Ala Asp Ala Leu Ile  Thr Thr Leu
    1265                1270                1275

Lys Pro  Arg Tyr Glu Asp Thr  Asn Ile Arg Ile Asn  Leu Asp Ser
    1280                1285                1290

Asn Thr  Arg Ser Phe Ile Val  Pro Ile Ile Thr Thr  Glu Tyr Ile
    1295                1300                1305

Arg Glu  Lys Leu Ser Tyr Ser  Phe Tyr Gly Ser Gly  Gly Thr Tyr
    1310                1315                1320

Ala Leu  Ser Leu Ser Gln Tyr  Asn Met Gly Ile Asn  Ile Glu Leu
    1325                1330                1335
```

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```
Ser Glu  Ser Asp Val Trp Ile  Ile Asp Val Asp Asn  Val Val Arg
    1340                1345                1350

Asp Val  Thr Ile Glu Ser Asp  Lys Ile Lys Lys Gly  Asp Leu Ile
    1355                1360                1365

Glu Gly  Ile Leu Ser Thr Leu  Ser Ile Glu Glu Asn  Lys Ile Ile
    1370                1375                1380

Leu Asn  Ser His Glu Ile Asn  Phe Ser Gly Glu Val  Asn Gly Ser
    1385                1390                1395

Asn Gly  Phe Val Ser Leu Thr  Phe Ser Ile Leu Glu  Gly Ile Asn
    1400                1405                1410

Ala Ile  Ile Glu Val Asp Leu  Leu Ser Lys Ser Tyr  Lys Leu Leu
    1415                1420                1425

Ile Ser  Gly Glu Leu Lys Ile  Leu Met Leu Asn Ser  Asn His Ile
    1430                1435                1440

Gln Gln  Lys Ile Asp Tyr Ile  Gly Phe Asn Ser Glu  Leu Gln Lys
    1445                1450                1455

Asn Ile  Pro Tyr Ser Phe Val  Asp Ser Glu Gly Lys  Glu Asn Gly
    1460                1465                1470

Phe Ile  Asn Gly Ser Thr Lys  Glu Gly Leu Phe Val  Ser Glu Leu
    1475                1480                1485

Pro Asp  Val Val Leu Ile Ser  Lys Val Tyr Met Asp  Asp Ser Lys
    1490                1495                1500

Pro Ser  Phe Gly Tyr Tyr Ser  Asn Asn Leu Lys Asp  Val Lys Val
    1505                1510                1515

Ile Thr  Lys Asp Asn Val Asn  Ile Leu Thr Gly Tyr  Tyr Leu Lys
    1520                1525                1530
```

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```
Asp Asp  Ile Lys Ile Ser Leu  Ser Leu Thr Leu Gln  Asp Glu Lys
    1535                1540                1545

Thr Ile  Lys Leu Asn Ser Val  His Leu Asp Glu Ser  Gly Val Ala
    1550                1555                1560

Glu Ile  Leu Lys Phe Met Asn  Arg Lys Gly Asn Thr  Asn Thr Ser
    1565                1570                1575

Asp Ser  Leu Met Ser Phe Leu  Glu Ser Met Asn Ile  Lys Ser Ile
    1580                1585                1590

Phe Val  Asn Phe Leu Gln Ser  Asn Ile Lys Phe Ile  Leu Asp Ala
    1595                1600                1605

Asn Phe  Ile Ile Ser Gly Thr  Thr Ser Ile Gly Gln  Phe Glu Phe
    1610                1615                1620

Ile Cys  Asp Glu Asn Asp Asn  Ile Gln Pro Tyr Phe  Ile Lys Phe
    1625                1630                1635

Asn Thr  Leu Glu Thr Asn Tyr  Thr Leu Tyr Val Gly  Asn Arg Gln
    1640                1645                1650

Asn Met  Ile Val Glu Pro Asn  Tyr Asp Leu Asp Asp  Ser Gly Asp
    1655                1660                1665

Ile Ser  Ser Thr Val Ile Asn  Phe Ser Gln Lys Tyr  Leu Tyr Gly
    1670                1675                1680

Ile Asp  Ser Cys Val Asn Lys  Val Val Ile Ser Pro  Asn Ile Tyr
    1685                1690                1695

Thr Asp  Glu Ile Asn Ile Thr  Pro Val Tyr Glu Thr  Asn Asn Thr
    1700                1705                1710

Tyr Pro  Glu Val Ile Val Leu  Asp Ala Asn Tyr Ile  Asn Glu Lys
    1715                1720                1725
```

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```
Ile Asn  Val Asn Ile Asn Asp  Leu Ser Ile Arg Tyr  Val Trp Ser
    1730                1735                1740

Asn Asp  Gly Asn Asp Phe Ile  Leu Met Ser Thr Ser  Glu Glu Asn
    1745                1750                1755

Lys Val  Ser Gln Val Lys Ile  Arg Phe Val Asn Val  Phe Lys Asp
    1760                1765                1770

Lys Thr  Leu Ala Asn Lys Leu  Ser Phe Asn Phe Ser  Asp Lys Gln
    1775                1780                1785

Asp Val  Pro Val Ser Glu Ile  Ile Leu Ser Phe Thr  Pro Ser Tyr
    1790                1795                1800

Tyr Glu  Asp Gly Leu Ile Gly  Tyr Asp Leu Gly Leu  Val Ser Leu
    1805                1810                1815

Tyr Asn  Glu Lys Phe Tyr Ile  Asn Asn Phe Gly Met  Met Val Ser
    1820                1825                1830

Gly Leu  Ile Tyr Ile Asn Asp  Ser Leu Tyr Tyr Phe  Lys Pro Pro
    1835                1840                1845

Val Asn  Asn Leu Ile Thr Gly  Phe Val Thr Val Gly  Asp Asp Lys
    1850                1855                1860

Tyr Tyr  Phe Asn Pro Ile Asn  Gly Gly Ala Ala Ser  Ile Gly Glu
    1865                1870                1875

Thr Ile  Ile Asp Asp Lys Asn  Tyr Tyr Phe Asn Gln  Ser Gly Val
    1880                1885                1890

Leu Gln  Thr Gly Val Phe Ser  Thr Glu Asp Gly Phe  Lys Tyr Phe
    1895                1900                1905

Ala Pro  Ala Asn Thr Leu Asp  Glu Asn Leu Glu Gly  Glu Ala Ile
    1910                1915                1920
```

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```
Asp Phe  Thr Gly Lys Leu Ile  Ile Asp Glu Asn Ile  Tyr Tyr Phe
    1925                1930                1935

Asp Asp  Asn Tyr Arg Gly Ala  Val Glu Trp Lys Glu  Leu Asp Gly
    1940                1945                1950

Glu Met  His Tyr Phe Ser Pro  Glu Thr Gly Lys Ala  Phe Lys Gly
    1955                1960                1965

Leu Asn  Gln Ile Gly Asp Asp  Lys Tyr Tyr Phe Asn  Ser Asp Gly
    1970                1975                1980

Val Met  Gln Lys Gly Phe Val  Ser Ile Asn Asp Asn  Lys His Tyr
    1985                1990                1995

Phe Asp  Asp Ser Gly Val Met  Lys Val Gly Tyr Thr  Glu Ile Asp
    2000                2005                2010

Gly Lys  His Phe Tyr Phe Ala  Glu Asn Gly Glu Met  Gln Ile Gly
    2015                2020                2025

Val Phe  Asn Thr Glu Asp Gly  Phe Lys Tyr Phe Ala  His His Asn
    2030                2035                2040

Glu Asp  Leu Gly Asn Glu Glu  Gly Glu Glu Ile Ser  Tyr Ser Gly
    2045                2050                2055

Ile Leu  Asn Phe Asn Asn Lys  Ile Tyr Tyr Phe Asp  Asp Ser Phe
    2060                2065                2070

Thr Ala  Val Val Gly Trp Lys  Asp Leu Glu Asp Gly  Ser Lys Tyr
    2075                2080                2085

Tyr Phe  Asp Glu Asp Thr Ala  Glu Ala Tyr Ile Gly  Leu Ser Leu
    2090                2095                2100

Ile Asn  Asp Gly Gln Tyr Tyr  Phe Asn Asp Asp Gly  Ile Met Gln
    2105                2110                2115
```

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Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp
2120 2125 2130

Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
2135 2140 2145

Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp
2150 2155 2160

Thr Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn
2165 2170 2175

Asp Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg
2180 2185 2190

Val Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu
2195 2200 2205

Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile
2225 2230 2235

Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr
2240 2245 2250

Gly Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn
2255 2260 2265

Gly Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe
2270 2275 2280

Tyr Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr
2285 2290 2295

Pro Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu
2300 2305 2310

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Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu
2315 2320 2325

Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr
2330 2335 2340

Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp
2345 2350 2355

Thr Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 116
<211> 2366
<212> PRT
<213> Clostridium difficile

<400> 116

Met Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg
1 5 10 15

Phe Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
20 25 30

Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
35 40 45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
50 55 60

Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65 70 75 80

Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys
85 90 95

Asn Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
100 105 110

Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn

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        115                 120                 125

Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
    130                 135                 140

Ile Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145                 150                 155                 160

Leu Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met
                165                 170                 175

Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala
            180                 185                 190

Gln Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile
        195                 200                 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr
    210                 215                 220

Ile Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val
225                 230                 235                 240

Arg Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu
                245                 250                 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu
            260                 265                 270

Arg Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp
        275                 280                 285

Met Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro
    290                 295                 300

Ser Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile
305                 310                 315                 320

Met Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp
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325 330 335

Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser
340 345 350

Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala
355 360 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn
370 375 380

Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val
385 390 395 400

Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro
405 410 415

Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile
420 425 430

Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met
435 440 445

Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr
450 455 460

Thr Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp
465 470 475 480

Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala
485 490 495

Asp Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr
500 505 510

Glu Gln Glu Met Ala Ser Leu Trp Thr Phe Asp Asp Ala Arg Ala Lys
515 520 525

Val Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly

```
    530                 535                 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu
545                 550                 555                 560

Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly
                565                 570                 575

Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
            580                 585                 590

Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Ile Leu Phe
        595                 600                 605

Gln Lys Asn Ile Glu Asn Ser Glu Val Ala Tyr Tyr Tyr Asn Pro Gly
    610                 615                 620

Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Arg Ile Pro Ser Ile Ile
625                 630                 635                 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp
                645                 650                 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser
            660                 665                 670

Thr Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Ser
        675                 680                 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser
    690                 695                 700

Ile Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys
705                 710                 715                 720

Asp Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
                725                 730                 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Asn Glu Gly Arg Arg
```

740 745 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
755 760 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
770 775 780

Asn Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785 790 795 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Leu Ser Asp Ile Glu Leu Glu
805 810 815

Glu Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
820 825 830

Asp Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr
835 840 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser
850 855 860

Ile Ser Asp Ser Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Asp Asp
865 870 875 880

Ser His Phe Ile Ser Phe Glu Asp Ile Ser Lys Thr Glu Asp Gly Phe
885 890 895

Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
900 905 910

Thr Glu Lys Glu Ile Phe Ser Glu Tyr Ala Asn His Ile Glu Arg Glu
915 920 925

Ile Ser Asn Ile Lys Asp Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
930 935 940

Val Lys Lys Val Asn Leu Asp Ala Ile His Glu Val Asn Thr Leu Asn

945 950 955 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Gly Tyr Ser Ser Ser Lys Glu
965 970 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
980 985 990

Leu Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp Ala Ala Lys Val Val
995 1000 1005

Glu Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu Pro
1010 1015 1020

Thr Leu Ser Glu Gly Leu Pro Val Ile Ala Thr Ile Ile Asp Gly
1025 1030 1035

Val Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp
1040 1045 1050

Pro Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala
1055 1060 1065

Val Asn Leu Thr Ala Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu
1070 1075 1080

Gly Ile Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly
1085 1090 1095

Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu
1100 1105 1110

Arg Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Ile Ser
1115 1120 1125

Leu Val Glu Thr Glu Gly Ala Phe Thr Leu Leu Asp Asp Lys Ile
1130 1135 1140

Met Ile Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn

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1145 1150 1155

Asn Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu
1160 1165 1170

Gly Gly Ser Gly His Thr Val Thr Asn Asp Ile Asp His Phe Phe
1175 1180 1185

Ser Ser Pro Thr Ile Thr Tyr Ile Lys Pro His Leu Ser Ile Tyr
1190 1195 1200

Asp Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp
1205 1210 1215

Leu Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu
1220 1225 1230

Thr Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Glu Gly Thr
1235 1240 1245

Lys Leu Leu Asp Arg Ile Arg Asp His Tyr Lys Gly Glu Phe Tyr
1250 1255 1260

Trp Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu
1265 1270 1275

Lys Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser
1280 1285 1290

Asn Asn Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu His Ile
1295 1300 1305

Arg Glu Lys Leu Ser Tyr Ser Phe His Gly Ser Gly Gly Thr Tyr
1310 1315 1320

Ala Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu
1325 1330 1335

Ser Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg

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1340 1345 1350

Asp Val Thr Ile Asp Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile
1355 1360 1365

Glu Gly Ile Leu Ser Thr Leu Ser Ile Glu Asp Asn Lys Ile Ile
1370 1375 1380

Leu Asn His His Glu Ile Asn Phe Ser Gly Asp Val Asn Gly Ser
1385 1390 1395

Asn Gly Phe Ile Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn
1400 1405 1410

Ala Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu
1415 1420 1425

Ile Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile
1430 1435 1440

Gln Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys
1445 1450 1455

Asn Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly
1460 1465 1470

Phe Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu
1475 1480 1485

Pro Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys
1490 1495 1500

Pro Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val
1505 1510 1515

Ile Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys
1520 1525 1530

Asp Asp Ile Lys Ile Ser Leu Ser Phe Thr Leu Gln Asp Glu Lys

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1535 1540 1545

Thr Ile Lys Leu Asn Gly Val His Leu Asp Glu Ser Gly Val Ala
1550 1555 1560

Glu Ile Leu Lys Phe Met Asn Lys Lys Gly Ser Thr Asn Thr Ser
1565 1570 1575

Asp Ser Leu Met Ser Phe Leu Glu Ser Val Asn Ile Lys Ser Ile
1580 1585 1590

Phe Val Asn Phe Leu Gln Ser Lys Ile Asn Phe Ile Leu Asp Ala
1595 1600 1605

Asn Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe
1610 1615 1620

Ile Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe
1625 1630 1635

Asn Thr Leu Glu Thr Thr Tyr Thr Leu Tyr Val Gly Asn Arg Gln
1640 1645 1650

Asn Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp
1655 1660 1665

Ile Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly
1670 1675 1680

Ile Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr
1685 1690 1695

Thr Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Asn
1700 1705 1710

Tyr Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys
1715 1720 1725

Ile Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser

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1730 1735 1740

Asn Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn
1745 1750 1755

Lys Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp
1760 1765 1770

Lys Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln
1775 1780 1785

Asp Val Pro Val Ser Glu Ile Ile Ser Ala Phe Thr Pro Ser Tyr
1790 1795 1800

Tyr Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu
1805 1810 1815

Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser
1820 1825 1830

Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro
1835 1840 1845

Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys
1850 1855 1860

Tyr Tyr Phe Asn Pro Thr Asn Gly Gly Ala Ala Ser Ile Gly Glu
1865 1870 1875

Thr Ile Ile Asn Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Ile
1880 1885 1890

Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Leu Lys Tyr Phe
1895 1900 1905

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile
1910 1915 1920

Asp Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe

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1925 1930 1935

Glu Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly
1940 1945 1950

Glu Met Tyr Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly
1955 1960 1965

Leu Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly
1970 1975 1980

Ile Met Gln Lys Gly Phe Val Ser Ile Asn Asp Lys Lys Tyr Tyr
1985 1990 1995

Phe Asp Asp Ser Gly Val Met Lys Val Gly Tyr Ile Glu Ile Asp
2000 2005 2010

Gly Lys Tyr Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly
2015 2020 2025

Val Phe Asn Thr Ser Asp Gly Phe Lys Tyr Phe Ala His His Asn
2030 2035 2040

Glu Asp Leu Gly Asn Glu Glu Gly Glu Ala Ile Ser Tyr Ser Gly
2045 2050 2055

Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Tyr Ser Phe
2060 2065 2070

Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr
2075 2080 2085

Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Val Gly Leu Ser Leu
2090 2095 2100

Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln
2105 2110 2115

Val Gly Phe Val Thr Ile Asn Asn Lys Val Phe Tyr Phe Ser Asp

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2120 2125 2130

Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
2135 2140 2145

Phe Tyr Ile Asp Glu Lys Gly Ile Val Gln Ile Gly Val Phe Asp
2150 2155 2160

Thr Ser Asp Glu Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn
2165 2170 2175

Asp Asn Ile Tyr Gly Gln Ala Val Asp Tyr Ser Gly Leu Val Arg
2180 2185 2190

Val Gly Glu Asp Ile Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu
2195 2200 2205

Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile
2225 2230 2235

Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Asn Gly Ile Met Arg Thr
2240 2245 2250

Gly Leu Ile Ser Phe Glu Asn Asn Asp Tyr Tyr Phe Asn Glu Asn
2255 2260 2265

Gly Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe
2270 2275 2280

Tyr Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr
2285 2290 2295

Gln Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu
2300 2305 2310

Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu

2315 2320 2325

Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr
2330 2335 2340

Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp
2345 2350 2355

Thr Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 117
<211> 2366
<212> PRT
<213> Clostridium difficile

<400> 117

Met Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg
1 5 10 15

Phe Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
20 25 30

Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
35 40 45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
50 55 60

Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65 70 75 80

Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys
85 90 95

Asn Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
100 105 110

Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
115 120 125

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Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
130 135 140

Val Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145 150 155 160

Leu Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met
165 170 175

Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala
180 185 190

Gln Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr
195 200 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr
210 215 220

Ile Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val
225 230 235 240

Arg Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu
245 250 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu
260 265 270

Arg Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp
275 280 285

Met Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro
290 295 300

Ser Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile
305 310 315 320

Met Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp
325 330 335

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```
Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
            340                 345                 350

Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala
        355                 360                 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn
    370                 375                 380

Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val
385                 390                 395                 400

Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro
                405                 410                 415

Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile
            420                 425                 430

Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met
        435                 440                 445

Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr
    450                 455                 460

Thr Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp
465                 470                 475                 480

Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala
                485                 490                 495

Asp Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr
            500                 505                 510

Glu Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys
        515                 520                 525

Ala Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly
    530                 535                 540
```

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```
Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu
545                 550                 555                 560

Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly
                565                 570                 575

Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
            580                 585                 590

Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe
        595                 600                 605

Gln Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly
    610                 615                 620

Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile
625                 630                 635                 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp
                645                 650                 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser
            660                 665                 670

Thr Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro
        675                 680                 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser
    690                 695                 700

Ile Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys
705                 710                 715                 720

Asp Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
                725                 730                 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg
            740                 745                 750
```

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```
Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
        755                 760                 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
    770                 775                 780

Asn Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785                 790                 795                 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu
                805                 810                 815

Glu Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
            820                 825                 830

Asp Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr
        835                 840                 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser
    850                 855                 860

Ile Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp
865                 870                 875                 880

Ser His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe
                885                 890                 895

Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
            900                 905                 910

Thr Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu
        915                 920                 925

Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
    930                 935                 940

Val Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn
945                 950                 955                 960
```

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```
Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu
               965                 970                 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
            980                 985                 990

Leu Phe Ser Thr Gly Leu Asn Thr  Ile Thr Asp Ala Ala  Lys Val Val
        995                 1000                1005

Glu Leu  Val Ser Thr Ala Leu  Asp Glu Thr Ile Asp  Leu Leu Pro
    1010                1015                1020

Thr Leu  Ser Glu Gly Leu Pro  Ile Ile Ala Thr Ile  Ile Asp Gly
    1025                1030                1035

Val Ser  Leu Gly Ala Ala Ile  Lys Glu Leu Ser Glu  Thr Ser Asp
    1040                1045                1050

Pro Leu  Leu Arg Gln Glu Ile  Glu Ala Lys Ile Gly  Ile Met Ala
    1055                1060                1065

Val Asn  Leu Thr Thr Ala Thr  Thr Ala Ile Ile Thr  Ser Ser Leu
    1070                1075                1080

Gly Ile  Ala Ser Gly Phe Ser  Ile Leu Leu Val Pro  Leu Ala Gly
    1085                1090                1095

Ile Ser  Ala Gly Ile Pro Ser  Leu Val Asn Asn Glu  Leu Val Leu
    1100                1105                1110

Arg Asp  Lys Ala Thr Lys Val  Val Asp Tyr Phe Lys  His Val Ser
    1115                1120                1125

Leu Val  Glu Thr Glu Gly Val  Phe Thr Leu Leu Asp  Asp Lys Ile
    1130                1135                1140

Met Met  Pro Gln Asp Asp Leu  Val Ile Ser Glu Ile  Asp Phe Asn
    1145                1150                1155
```

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```
Asn Asn  Ser Ile Val Leu Gly  Lys Cys Glu Ile Trp  Arg Met Glu
    1160                1165                1170

Gly Gly  Ser Gly His Thr Val  Thr Asp Asp Ile Asp  His Phe Phe
    1175                1180                1185

Ser Ala  Pro Ser Ile Thr Tyr  Arg Glu Pro His Leu  Ser Ile Tyr
    1190                1195                1200

Asp Val  Leu Glu Val Gln Lys  Glu Glu Leu Asp Leu  Ser Lys Asp
    1205                1210                1215

Leu Met  Val Leu Pro Asn Ala  Pro Asn Arg Val Phe  Ala Trp Glu
    1220                1225                1230

Thr Gly  Trp Thr Pro Gly Leu  Arg Ser Leu Glu Asn  Asp Gly Thr
    1235                1240                1245

Lys Leu  Leu Asp Arg Ile Arg  Asp Asn Tyr Glu Gly  Glu Phe Tyr
    1250                1255                1260

Trp Arg  Tyr Phe Ala Phe Ile  Ala Asp Ala Leu Ile  Thr Thr Leu
    1265                1270                1275

Lys Pro  Arg Tyr Glu Asp Thr  Asn Ile Arg Ile Asn  Leu Asp Ser
    1280                1285                1290

Asn Thr  Arg Ser Phe Ile Val  Pro Ile Ile Thr Thr  Glu Tyr Ile
    1295                1300                1305

Arg Glu  Lys Leu Ser Tyr Ser  Phe Tyr Gly Ser Gly  Gly Thr Tyr
    1310                1315                1320

Ala Leu  Ser Leu Ser Gln Tyr  Asn Met Gly Ile Asn  Ile Glu Leu
    1325                1330                1335

Ser Glu  Ser Asp Val Trp Ile  Ile Asp Val Asp Asn  Val Val Arg
    1340                1345                1350
```

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```
Asp Val  Thr Ile Glu Ser Asp  Lys Ile Lys Lys Gly  Asp Leu Ile
    1355                1360                1365

Glu Gly  Ile Leu Ser Thr Leu  Ser Ile Glu Glu Asn  Lys Ile Ile
    1370                1375                1380

Leu Asn  Ser His Glu Ile Asn  Phe Ser Gly Glu Val  Asn Gly Ser
    1385                1390                1395

Asn Gly  Phe Val Ser Leu Thr  Phe Ser Ile Leu Glu  Gly Ile Asn
    1400                1405                1410

Ala Ile  Ile Glu Val Asp Leu  Leu Ser Lys Ser Tyr  Lys Leu Leu
    1415                1420                1425

Ile Ser  Gly Glu Leu Lys Ile  Leu Met Leu Asn Ser  Asn His Ile
    1430                1435                1440

Gln Gln  Lys Ile Asp Tyr Ile  Gly Phe Asn Ser Glu  Leu Gln Lys
    1445                1450                1455

Asn Ile  Pro Tyr Ser Phe Val  Asp Ser Glu Gly Lys  Glu Asn Gly
    1460                1465                1470

Phe Ile  Asn Gly Ser Thr Lys  Glu Gly Leu Phe Val  Ser Glu Leu
    1475                1480                1485

Pro Asp  Val Val Leu Ile Ser  Lys Val Tyr Met Asp  Asp Ser Lys
    1490                1495                1500

Pro Ser  Phe Gly Tyr Tyr Ser  Asn Asn Leu Lys Asp  Val Lys Val
    1505                1510                1515

Ile Thr  Lys Asp Asn Val Asn  Ile Leu Thr Gly Tyr  Tyr Leu Lys
    1520                1525                1530

Asp Asp  Ile Lys Ile Ser Leu  Ser Leu Thr Leu Gln  Asp Glu Lys
    1535                1540                1545
```

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Thr Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala
1550 1555 1560

Glu Ile Leu Lys Phe Met Asn Arg Lys Gly Asn Thr Asn Thr Ser
1565 1570 1575

Asp Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile
1580 1585 1590

Phe Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala
1595 1600 1605

Asn Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe
1610 1615 1620

Ile Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe
1625 1630 1635

Asn Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln
1640 1645 1650

Asn Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp
1655 1660 1665

Ile Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly
1670 1675 1680

Ile Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr
1685 1690 1695

Thr Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr
1700 1705 1710

Tyr Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys
1715 1720 1725

Ile Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser
1730 1735 1740

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```
Asn Asp  Gly Asn Asp Phe Ile  Leu Met Ser Thr Ser  Glu Glu Asn
    1745                1750                1755

Lys Val  Ser Gln Val Lys Ile  Arg Phe Val Asn Val  Phe Lys Asp
    1760                1765                1770

Lys Thr  Leu Ala Asn Lys Leu  Ser Phe Asn Phe Ser  Asp Lys Gln
    1775                1780                1785

Asp Val  Pro Val Ser Glu Ile  Ile Leu Ser Phe Thr  Pro Ser Tyr
    1790                1795                1800

Tyr Glu  Asp Gly Leu Ile Gly  Tyr Asp Leu Gly Leu  Val Ser Leu
    1805                1810                1815

Tyr Asn  Glu Lys Phe Tyr Ile  Asn Asn Phe Gly Met  Met Val Ser
    1820                1825                1830

Gly Leu  Ile Tyr Ile Asn Asp  Ser Leu Tyr Tyr Phe  Lys Pro Pro
    1835                1840                1845

Val Asn  Asn Leu Ile Thr Gly  Phe Val Thr Val Gly  Asp Asp Lys
    1850                1855                1860

Tyr Tyr  Phe Asn Pro Ile Asn  Gly Gly Ala Ala Ser  Ile Gly Glu
    1865                1870                1875

Thr Ile  Ile Asp Asp Lys Asn  Tyr Tyr Phe Asn Gln  Ser Gly Val
    1880                1885                1890

Leu Gln  Thr Gly Val Phe Ser  Thr Glu Asp Gly Phe  Lys Tyr Phe
    1895                1900                1905

Ala Pro  Ala Asn Thr Leu Asp  Glu Asn Leu Glu Gly  Glu Ala Ile
    1910                1915                1920

Asp Phe  Thr Gly Lys Leu Ile  Ile Asp Glu Asn Ile  Tyr Tyr Phe
    1925                1930                1935
```

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```
Asp Asp  Asn Tyr Arg Gly Ala  Val Glu Trp Lys Glu  Leu Asp Gly
    1940                1945                1950

Glu Met  His Tyr Phe Ser Pro  Glu Thr Gly Lys Ala  Phe Lys Gly
    1955                1960                1965

Leu Asn  Gln Ile Gly Asp Asp  Lys Tyr Tyr Phe Asn  Ser Asp Gly
    1970                1975                1980

Val Met  Gln Lys Gly Phe Val  Ser Ile Asn Asp Asn  Lys His Tyr
    1985                1990                1995

Phe Asp  Asp Ser Gly Val Met  Lys Val Gly Tyr Thr  Glu Ile Asp
    2000                2005                2010

Gly Lys  His Phe Tyr Phe Ala  Glu Asn Gly Glu Met  Gln Ile Gly
    2015                2020                2025

Val Phe  Asn Thr Glu Asp Gly  Phe Lys Tyr Phe Ala  His His Asn
    2030                2035                2040

Glu Asp  Leu Gly Asn Glu Glu  Gly Glu Glu Ile Ser  Tyr Ser Gly
    2045                2050                2055

Ile Leu  Asn Phe Asn Asn Lys  Ile Tyr Tyr Phe Asp  Asp Ser Phe
    2060                2065                2070

Thr Ala  Val Val Gly Trp Lys  Asp Leu Glu Asp Gly  Ser Lys Tyr
    2075                2080                2085

Tyr Phe  Asp Glu Asp Thr Ala  Glu Ala Tyr Ile Gly  Leu Ser Leu
    2090                2095                2100

Ile Asn  Asp Gly Gln Tyr Tyr  Phe Asn Asp Asp Gly  Ile Met Gln
    2105                2110                2115

Val Gly  Phe Val Thr Ile Asn  Asp Lys Val Phe Tyr  Phe Ser Asp
    2120                2125                2130
```

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```
Ser Gly  Ile Ile Glu Ser Gly  Val Gln Asn Ile Asp  Asp Asn Tyr
    2135                 2140                 2145

Phe Tyr  Ile Asp Asp Asn Gly  Ile Val Gln Ile Gly  Val Phe Asp
    2150                 2155                 2160

Thr Ser  Asp Gly Tyr Lys Tyr  Phe Ala Pro Ala Asn  Thr Val Asn
    2165                 2170                 2175

Asp Asn  Ile Tyr Gly Gln Ala  Val Glu Tyr Ser Gly  Leu Val Arg
    2180                 2185                 2190

Val Gly  Glu Asp Val Tyr Tyr  Phe Gly Glu Thr Tyr  Thr Ile Glu
    2195                 2200                 2205

Thr Gly  Trp Ile Tyr Asp Met  Glu Asn Glu Ser Asp  Lys Tyr Tyr
    2210                 2215                 2220

Phe Asn  Pro Glu Thr Lys Lys  Ala Cys Lys Gly Ile  Asn Leu Ile
    2225                 2230                 2235

Asp Asp  Ile Lys Tyr Tyr Phe  Asp Glu Lys Gly Ile  Met Arg Thr
    2240                 2245                 2250

Gly Leu  Ile Ser Phe Glu Asn  Asn Asn Tyr Tyr Phe  Asn Glu Asn
    2255                 2260                 2265

Gly Glu  Met Gln Phe Gly Tyr  Ile Asn Ile Glu Asp  Lys Met Phe
    2270                 2275                 2280

Tyr Phe  Gly Glu Asp Gly Val  Met Gln Ile Gly Val  Phe Asn Thr
    2285                 2290                 2295

Pro Asp  Gly Phe Lys Tyr Phe  Ala His Gln Asn Thr  Leu Asp Glu
    2300                 2305                 2310

Asn Phe  Glu Gly Glu Ser Ile  Asn Tyr Thr Gly Trp  Leu Asp Leu
    2315                 2320                 2325
```

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Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr
2330 2335 2340

Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp
2345 2350 2355

Thr Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 118
<211> 2366
<212> PRT
<213> Clostridium difficile

<400> 118

Met Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg
1 5 10 15

Phe Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
20 25 30

Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
35 40 45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
50 55 60

Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65 70 75 80

Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys
85 90 95

Asn Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
100 105 110

Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
115 120 125

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```
Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
    130                 135                 140

Ile Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145                 150                 155                 160

Leu Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met
                165                 170                 175

Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala
            180                 185                 190

Gln Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile
        195                 200                 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr
    210                 215                 220

Ile Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val
225                 230                 235                 240

Arg Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu
                245                 250                 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu
            260                 265                 270

Arg Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp
        275                 280                 285

Met Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro
    290                 295                 300

Ser Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile
305                 310                 315                 320

Met Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp
                325                 330                 335
```

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```
Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser
            340                 345                 350

Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala
        355                 360                 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn
    370                 375                 380

Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val
385                 390                 395                 400

Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro
                405                 410                 415

Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile
            420                 425                 430

Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met
        435                 440                 445

Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr
    450                 455                 460

Thr Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp
465                 470                 475                 480

Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala
                485                 490                 495

Asp Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr
            500                 505                 510

Glu Gln Glu Met Ala Ser Leu Trp Thr Phe Asp Asp Ala Arg Ala Lys
        515                 520                 525

Val Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly
    530                 535                 540
```

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```
Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu
545                 550                 555                 560

Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly
                565                 570                 575

Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
            580                 585                 590

Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Ile Leu Phe
        595                 600                 605

Gln Lys Asn Ile Glu Asn Ser Glu Val Ala Tyr Tyr Tyr Asn Pro Gly
    610                 615                 620

Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Arg Ile Pro Ser Ile Ile
625                 630                 635                 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp
                645                 650                 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser
            660                 665                 670

Thr Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Ser
        675                 680                 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser
    690                 695                 700

Ile Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys
705                 710                 715                 720

Asp Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
                725                 730                 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Asn Glu Gly Arg Arg
            740                 745                 750
```

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```
Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
        755                 760                 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
    770                 775                 780

Asn Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785                 790                 795                 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Leu Ser Asp Ile Glu Leu Glu
                805                 810                 815

Glu Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
            820                 825                 830

Asp Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr
        835                 840                 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser
    850                 855                 860

Ile Ser Asp Ser Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Asp Asp
865                 870                 875                 880

Ser His Phe Ile Ser Phe Glu Asp Ile Ser Lys Thr Glu Asp Gly Phe
                885                 890                 895

Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
            900                 905                 910

Thr Glu Lys Glu Ile Phe Ser Glu Tyr Ala Asn His Ile Glu Arg Glu
        915                 920                 925

Ile Ser Asn Ile Lys Asp Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
    930                 935                 940

Val Lys Lys Val Asn Leu Asp Ala Ile His Glu Val Asn Thr Leu Asn
945                 950                 955                 960
```

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```
Ala Ala Phe Phe Ile Gln Ser Leu Ile Gly Tyr Ser Ser Ser Lys Glu
               965                 970                 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
           980                 985                 990

Leu Phe Ser Thr Gly Leu Asn Thr  Ile Thr Asp Ala Ala  Lys Val Val
        995                 1000                1005

Glu Leu  Val Ser Thr Ala Leu  Asp Glu Thr Ile Asp  Leu Leu Pro
    1010                1015                1020

Thr Leu  Ser Glu Gly Leu Pro  Val Ile Ala Thr Ile  Ile Asp Gly
    1025                1030                1035

Val Ser  Leu Gly Ala Ala Ile  Lys Glu Leu Ser Glu  Thr Ser Asp
    1040                1045                1050

Pro Leu  Leu Arg Gln Glu Ile  Glu Ala Lys Ile Gly  Ile Met Ala
    1055                1060                1065

Val Asn  Leu Thr Ala Ala Thr  Thr Ala Ile Ile Thr  Ser Ser Leu
    1070                1075                1080

Gly Ile  Ala Ser Gly Phe Ser  Ile Leu Leu Val Pro  Leu Ala Gly
    1085                1090                1095

Ile Ser  Ala Gly Ile Pro Ser  Leu Val Asn Asn Glu  Leu Val Leu
    1100                1105                1110

Arg Asp  Lys Ala Thr Lys Val  Val Asp Tyr Phe Lys  His Ile Ser
    1115                1120                1125

Leu Val  Glu Thr Glu Gly Ala  Phe Thr Leu Leu Asp  Asp Lys Ile
    1130                1135                1140

Met Ile  Pro Gln Asp Asp Leu  Val Ile Ser Glu Ile  Asp Phe Asn
    1145                1150                1155
```

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```
Asn Asn  Ser Ile Val Leu Gly  Lys Cys Glu Ile Trp  Arg Met Glu
    1160                 1165                 1170

Gly Gly  Ser Gly His Thr Val  Thr Asn Asp Ile Asp  His Phe Phe
    1175                 1180                 1185

Ser Ser  Pro Thr Ile Thr Tyr  Ile Lys Pro His Leu  Ser Ile Tyr
    1190                 1195                 1200

Asp Val  Leu Glu Val Gln Lys  Glu Glu Leu Asp Leu  Ser Lys Asp
    1205                 1210                 1215

Leu Met  Val Leu Pro Asn Ala  Pro Asn Arg Val Phe  Ala Trp Glu
    1220                 1225                 1230

Thr Gly  Trp Thr Pro Gly Leu  Arg Ser Leu Glu Asn  Glu Gly Thr
    1235                 1240                 1245

Lys Leu  Leu Asp Arg Ile Arg  Asp His Tyr Lys Gly  Glu Phe Tyr
    1250                 1255                 1260

Trp Arg  Tyr Phe Ala Phe Ile  Ala Asp Ala Leu Ile  Thr Thr Leu
    1265                 1270                 1275

Lys Pro  Arg Tyr Glu Asp Thr  Asn Ile Arg Ile Asn  Leu Asp Ser
    1280                 1285                 1290

Asn Asn  Arg Ser Phe Ile Val  Pro Ile Ile Thr Thr  Glu His Ile
    1295                 1300                 1305

Arg Glu  Lys Leu Ser Tyr Ser  Phe His Gly Ser Gly  Gly Thr Tyr
    1310                 1315                 1320

Ala Leu  Ser Leu Ser Gln Tyr  Asn Met Gly Ile Asn  Ile Glu Leu
    1325                 1330                 1335

Ser Glu  Ser Asp Val Trp Ile  Ile Asp Val Asp Asn  Val Val Arg
    1340                 1345                 1350
```

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Asp Val Thr Ile Asp Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile
1355 1360 1365

Glu Gly Ile Leu Ser Thr Leu Ser Ile Glu Asp Asn Lys Ile Ile
1370 1375 1380

Leu Asn His His Glu Ile Asn Phe Ser Gly Asp Val Asn Gly Ser
1385 1390 1395

Asn Gly Phe Ile Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn
1400 1405 1410

Ala Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu
1415 1420 1425

Ile Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile
1430 1435 1440

Gln Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys
1445 1450 1455

Asn Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly
1460 1465 1470

Phe Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu
1475 1480 1485

Pro Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys
1490 1495 1500

Pro Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val
1505 1510 1515

Ile Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys
1520 1525 1530

Asp Asp Ile Lys Ile Ser Leu Ser Phe Thr Leu Gln Asp Glu Lys
1535 1540 1545

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Thr Ile Lys Leu Asn Gly Val His Leu Asp Glu Ser Gly Val Ala
1550 1555 1560

Glu Ile Leu Lys Phe Met Asn Lys Lys Gly Ser Thr Asn Thr Ser
1565 1570 1575

Asp Ser Leu Met Ser Phe Leu Glu Ser Val Asn Ile Lys Ser Ile
1580 1585 1590

Phe Val Asn Phe Leu Gln Ser Lys Ile Asn Phe Ile Leu Asp Ala
1595 1600 1605

Asn Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe
1610 1615 1620

Ile Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe
1625 1630 1635

Asn Thr Leu Glu Thr Thr Tyr Thr Leu Tyr Val Gly Asn Arg Gln
1640 1645 1650

Asn Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp
1655 1660 1665

Ile Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly
1670 1675 1680

Ile Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr
1685 1690 1695

Thr Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Asn
1700 1705 1710

Tyr Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys
1715 1720 1725

Ile Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser
1730 1735 1740

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```
Asn Asp  Gly Asn Asp Phe Ile  Leu Met Ser Thr Ser  Glu Glu Asn
    1745                1750                1755

Lys Val  Ser Gln Val Lys Ile  Arg Phe Val Asn Val  Phe Lys Asp
    1760                1765                1770

Lys Thr  Leu Ala Asn Lys Leu  Ser Phe Asn Phe Ser  Asp Lys Gln
    1775                1780                1785

Asp Val  Pro Val Ser Glu Ile  Ile Ser Ala Phe Thr  Pro Ser Tyr
    1790                1795                1800

Tyr Glu  Asp Gly Leu Ile Gly  Tyr Asp Leu Gly Leu  Val Ser Leu
    1805                1810                1815

Tyr Asn  Glu Lys Phe Tyr Ile  Asn Asn Phe Gly Met  Met Val Ser
    1820                1825                1830

Gly Leu  Ile Tyr Ile Asn Asp  Ser Leu Tyr Tyr Phe  Lys Pro Pro
    1835                1840                1845

Val Asn  Asn Leu Ile Thr Gly  Phe Val Thr Val Gly  Asp Asp Lys
    1850                1855                1860

Tyr Tyr  Phe Asn Pro Thr Asn  Gly Gly Ala Ala Ser  Ile Gly Glu
    1865                1870                1875

Thr Ile  Ile Asn Asp Lys Asn  Tyr Tyr Phe Asn Gln  Ser Gly Ile
    1880                1885                1890

Leu Gln  Thr Gly Val Phe Ser  Thr Glu Asp Gly Leu  Lys Tyr Phe
    1895                1900                1905

Ala Pro  Ala Asn Thr Leu Asp  Glu Asn Leu Glu Gly  Glu Ala Ile
    1910                1915                1920

Asp Phe  Thr Gly Lys Leu Ile  Ile Asp Glu Asn Ile  Tyr Tyr Phe
    1925                1930                1935
```

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```
Glu Asp  Asn Tyr Arg Gly Ala  Val Glu Trp Lys Glu  Leu Asp Gly
    1940                1945                1950

Glu Met  Tyr Tyr Phe Ser Pro  Glu Thr Gly Lys Ala  Phe Lys Gly
    1955                1960                1965

Leu Asn  Gln Ile Gly Asp Asp  Lys Tyr Tyr Phe Asn  Ser Asp Gly
    1970                1975                1980

Ile Met  Gln Lys Gly Phe Val  Ser Ile Asn Asp Lys  Lys Tyr Tyr
    1985                1990                1995

Phe Asp  Asp Ser Gly Val Met  Lys Val Gly Tyr Ile  Glu Ile Asp
    2000                2005                2010

Gly Lys  Tyr Phe Tyr Phe Ala  Glu Asn Gly Glu Met  Gln Ile Gly
    2015                2020                2025

Val Phe  Asn Thr Ser Asp Gly  Phe Lys Tyr Phe Ala  His His Asn
    2030                2035                2040

Glu Asp  Leu Gly Asn Glu Glu  Gly Glu Ala Ile Ser  Tyr Ser Gly
    2045                2050                2055

Ile Leu  Asn Phe Asn Asn Lys  Ile Tyr Tyr Phe Asp  Tyr Ser Phe
    2060                2065                2070

Thr Ala  Val Val Gly Trp Lys  Asp Leu Glu Asp Gly  Ser Lys Tyr
    2075                2080                2085

Tyr Phe  Asp Glu Asp Thr Ala  Glu Ala Tyr Val Gly  Leu Ser Leu
    2090                2095                2100

Ile Asn  Asp Gly Gln Tyr Tyr  Phe Asn Asp Asp Gly  Ile Met Gln
    2105                2110                2115

Val Gly  Phe Val Thr Ile Asn  Asn Lys Val Phe Tyr  Phe Ser Asp
    2120                2125                2130
```

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```
Ser Gly  Ile Ile Glu Ser Gly  Val Gln Asn Ile Asp  Asp Asn Tyr
    2135                2140                2145

Phe Tyr  Ile Asp Glu Lys Gly  Ile Val Gln Ile Gly  Val Phe Asp
    2150                2155                2160

Thr Ser  Asp Glu Tyr Lys Tyr  Phe Ala Pro Ala Asn  Thr Val Asn
    2165                2170                2175

Asp Asn  Ile Tyr Gly Gln Ala  Val Asp Tyr Ser Gly  Leu Val Arg
    2180                2185                2190

Val Gly  Glu Asp Ile Tyr Tyr  Phe Gly Glu Thr Tyr  Thr Ile Glu
    2195                2200                2205

Thr Gly  Trp Ile Tyr Asp Met  Glu Asn Glu Ser Asp  Lys Tyr Tyr
    2210                2215                2220

Phe Asn  Pro Glu Thr Lys Lys  Ala Cys Lys Gly Ile  Asn Leu Ile
    2225                2230                2235

Asp Asp  Ile Lys Tyr Tyr Phe  Asp Glu Asn Gly Ile  Met Arg Thr
    2240                2245                2250

Gly Leu  Ile Ser Phe Glu Asn  Asn Asp Tyr Tyr Phe  Asn Glu Asn
    2255                2260                2265

Gly Glu  Met Gln Phe Gly Tyr  Ile Asn Ile Glu Asp  Lys Met Phe
    2270                2275                2280

Tyr Phe  Gly Glu Asp Gly Val  Met Gln Ile Gly Val  Phe Asn Thr
    2285                2290                2295

Gln Asp  Gly Phe Lys Tyr Phe  Ala His Gln Asn Thr  Leu Asp Glu
    2300                2305                2310

Asn Phe  Glu Gly Glu Ser Ile  Asn Tyr Thr Gly Trp  Leu Asp Leu
    2315                2320                2325
```

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Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr
2330 2335 2340

Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp
2345 2350 2355

Thr Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 119
<211> 2366
<212> PRT
<213> Clostridium difficile

<400> 119

Met Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg
1 5 10 15

Phe Arg Val Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
20 25 30

Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
35 40 45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
50 55 60

Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65 70 75 80

Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys
85 90 95

Asn Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
100 105 110

Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
115 120 125

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```
Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
    130                 135                 140

Ile Val Glu Ser Ala Thr Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145                 150                 155                 160

Leu Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Tyr Arg Lys Arg Met
                165                 170                 175

Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Thr
            180                 185                 190

Gln Arg Glu Glu Asn Pro Asp Leu Ile Ile Asp Asp Ile Val Lys Ile
        195                 200                 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Asp Ile Asp Glu Leu Asn Ser Tyr
    210                 215                 220

Ile Glu Glu Ser Leu Asn Lys Val Thr Glu Asn Ser Gly Asn Asp Val
225                 230                 235                 240

Arg Asn Phe Glu Glu Phe Lys Gly Gly Glu Ser Phe Lys Leu Tyr Glu
                245                 250                 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu
            260                 265                 270

Arg Ile Ser Ala Leu Lys Glu Val Gly Gly Val Tyr Leu Asp Val Asp
        275                 280                 285

Met Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro
    290                 295                 300

Ser Ser Val Thr Val Asp Phe Trp Glu Met Val Lys Leu Glu Ala Ile
305                 310                 315                 320

Met Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp
                325                 330                 335
```

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```
Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
            340                 345                 350

Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala
        355                 360                 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn
    370                 375                 380

Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val
385                 390                 395                 400

Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro
                405                 410                 415

Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Ala Phe Ile
            420                 425                 430

Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met
        435                 440                 445

Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr
    450                 455                 460

Thr Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp
465                 470                 475                 480

Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala
                485                 490                 495

Asp Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr
            500                 505                 510

Glu Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys
        515                 520                 525

Ala Gln Phe Glu Glu Tyr Lys Lys Asn Tyr Phe Glu Gly Ser Leu Gly
    530                 535                 540
```

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```
Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Thr Val Val Asp Lys Glu
545                 550                 555                 560

Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly
                565                 570                 575

Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
            580                 585                 590

Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe
        595                 600                 605

Gln Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly
    610                 615                 620

Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile
625                 630                 635                 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp
                645                 650                 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser
            660                 665                 670

Thr Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro
        675                 680                 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser
    690                 695                 700

Val Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Arg Val Lys
705                 710                 715                 720

Asp Lys Val Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
                725                 730                 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg
            740                 745                 750
```

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```
Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
        755                 760                 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
    770                 775                 780

Asn Lys Ile Ile Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785                 790                 795                 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu
                805                 810                 815

Glu Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
            820                 825                 830

Asp Thr Gln Val Val Glu Gly Arg Ile Glu Glu Ala Lys Ser Leu Thr
        835                 840                 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser
    850                 855                 860

Ile Ser Asp Ala Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Glu Glu
865                 870                 875                 880

Ser His Phe Ile Ser Phe Glu Asp Ile Leu Glu Thr Asp Glu Gly Phe
                885                 890                 895

Ser Ile Arg Phe Ile Asp Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
            900                 905                 910

Thr Glu Lys Ala Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu
        915                 920                 925

Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
    930                 935                 940

Val Lys Lys Val Asn Leu Asp Ala Thr His Glu Val Asn Thr Leu Asn
945                 950                 955                 960
```

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```
Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu
               965                 970                 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
            980                 985                 990

Leu Phe Ser Thr Gly Leu Asn Thr  Ile Thr Asp Ala Ala  Lys Val Val
        995                 1000                1005

Glu Leu  Val Ser Thr Ala Leu  Asp Glu Thr Ile Asp  Leu Leu Pro
    1010                1015                1020

Thr Leu  Ser Glu Gly Leu Pro  Val Ile Ala Thr Ile  Ile Asp Gly
    1025                1030                1035

Val Ser  Leu Gly Ala Ala Ile  Lys Glu Leu Ser Glu  Thr Ser Asp
    1040                1045                1050

Pro Leu  Leu Arg Gln Glu Ile  Glu Ala Lys Ile Gly  Ile Met Ala
    1055                1060                1065

Val Asn  Leu Thr Ala Ala Thr  Thr Ala Ile Ile Thr  Ser Ser Leu
    1070                1075                1080

Gly Ile  Ala Ser Gly Phe Ser  Ile Leu Leu Val Pro  Leu Ala Gly
    1085                1090                1095

Ile Ser  Ala Gly Ile Pro Ser  Leu Val Asn Asn Glu  Leu Ile Leu
    1100                1105                1110

Arg Asp  Lys Ala Thr Lys Val  Val Asp Tyr Phe Ser  His Ile Ser
    1115                1120                1125

Leu Ala  Glu Ser Glu Gly Ala  Phe Thr Ser Leu Asp  Asp Lys Ile
    1130                1135                1140

Met Met  Pro Gln Asp Asp Leu  Val Ile Ser Glu Ile  Asp Phe Asn
    1145                1150                1155
```

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```
Asn Asn  Ser Ile Thr Leu Gly  Lys Cys Glu Ile Trp  Arg Met Glu
    1160                1165                1170

Gly Gly  Ser Gly His Thr Val  Thr Asp Asp Ile Asp  His Phe Phe
    1175                1180                1185

Ser Ala  Pro Ser Ile Thr Tyr  Arg Glu Pro His Leu  Ser Ile Tyr
    1190                1195                1200

Asp Val  Leu Glu Val Gln Lys  Glu Glu Leu Asp Leu  Ser Lys Asp
    1205                1210                1215

Leu Met  Val Leu Pro Asn Ala  Pro Asn Arg Val Phe  Ala Trp Glu
    1220                1225                1230

Thr Gly  Trp Thr Pro Gly Leu  Arg Ser Leu Glu Asn  Asp Gly Thr
    1235                1240                1245

Lys Leu  Leu Asp Arg Ile Arg  Asp Asn Tyr Glu Gly  Glu Phe Tyr
    1250                1255                1260

Trp Arg  Tyr Phe Ala Phe Ile  Ala Asp Ala Leu Ile  Thr Thr Leu
    1265                1270                1275

Lys Pro  Arg Tyr Glu Asp Thr  Asn Ile Arg Ile Asn  Leu Asp Ser
    1280                1285                1290

Asn Thr  Arg Ser Phe Ile Val  Pro Val Ile Thr Thr  Glu Tyr Ile
    1295                1300                1305

Arg Glu  Lys Leu Ser Tyr Ser  Phe Tyr Gly Ser Gly  Gly Thr Tyr
    1310                1315                1320

Ala Leu  Ser Leu Ser Gln Tyr  Asn Met Asn Ile Asn  Ile Glu Leu
    1325                1330                1335

Asn Glu  Asn Asp Thr Trp Val  Ile Asp Val Asp Asn  Val Val Arg
    1340                1345                1350
```

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```
Asp Val  Thr Ile Glu Ser Asp  Lys Ile Lys Lys Gly  Asp Leu Ile
    1355                1360                1365

Glu Asn  Ile Leu Ser Lys Leu  Ser Ile Glu Asp Asn  Lys Ile Ile
    1370                1375                1380

Leu Asp  Asn His Glu Ile Asn  Phe Ser Gly Thr Leu  Asn Gly Gly
    1385                1390                1395

Asn Gly  Phe Val Ser Leu Thr  Phe Ser Ile Leu Glu  Gly Ile Asn
    1400                1405                1410

Ala Val  Ile Glu Val Asp Leu  Leu Ser Lys Ser Tyr  Lys Val Leu
    1415                1420                1425

Ile Ser  Gly Glu Leu Lys Thr  Leu Met Ala Asn Ser  Asn Ser Val
    1430                1435                1440

Gln Gln  Lys Ile Asp Tyr Ile  Gly Leu Asn Ser Glu  Leu Gln Lys
    1445                1450                1455

Asn Ile  Pro Tyr Ser Phe Met  Asp Asp Lys Gly Lys  Glu Asn Gly
    1460                1465                1470

Phe Ile  Asn Cys Ser Thr Lys  Glu Gly Leu Phe Val  Ser Glu Leu
    1475                1480                1485

Ser Asp  Val Val Leu Ile Ser  Lys Val Tyr Met Asp  Asn Ser Lys
    1490                1495                1500

Pro Leu  Phe Gly Tyr Cys Ser  Asn Asp Leu Lys Asp  Val Lys Val
    1505                1510                1515

Ile Thr  Lys Asp Asp Val Ile  Ile Leu Thr Gly Tyr  Tyr Leu Lys
    1520                1525                1530

Asp Asp  Ile Lys Ile Ser Leu  Ser Phe Thr Ile Gln  Asp Glu Asn
    1535                1540                1545
```

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Thr Ile Lys Leu Asn Gly Val Tyr Leu Asp Glu Asn Gly Val Ala
1550 1555 1560

Glu Ile Leu Lys Phe Met Asn Lys Lys Gly Ser Thr Asn Thr Ser
1565 1570 1575

Asp Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile
1580 1585 1590

Phe Ile Asn Ser Leu Gln Ser Asn Thr Lys Leu Ile Leu Asp Thr
1595 1600 1605

Asn Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe
1610 1615 1620

Ile Cys Asp Lys Asp Asn Asn Ile Gln Pro Tyr Phe Ile Lys Phe
1625 1630 1635

Asn Thr Leu Glu Thr Lys Tyr Thr Leu Tyr Val Gly Asn Arg Gln
1640 1645 1650

Asn Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp
1655 1660 1665

Ile Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly
1670 1675 1680

Ile Asp Ser Cys Val Asn Lys Val Ile Ile Ser Pro Asn Ile Tyr
1685 1690 1695

Thr Asp Glu Ile Asn Ile Thr Pro Ile Tyr Glu Ala Asn Asn Thr
1700 1705 1710

Tyr Pro Glu Val Ile Val Leu Asp Thr Asn Tyr Ile Ser Glu Lys
1715 1720 1725

Ile Asn Ile Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser
1730 1735 1740

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```
Asn Asp  Gly Ser Asp Phe Ile  Leu Met Ser Thr Asp  Glu Glu Asn
    1745                1750                1755

Lys Val  Ser Gln Val Lys Ile  Arg Phe Thr Asn Val  Phe Lys Gly
    1760                1765                1770

Asn Thr  Ile Ser Asp Lys Ile  Ser Phe Asn Phe Ser  Asp Lys Gln
    1775                1780                1785

Asp Val  Ser Ile Asn Lys Val  Ile Ser Thr Phe Thr  Pro Ser Tyr
    1790                1795                1800

Tyr Val  Glu Gly Leu Leu Asn  Tyr Asp Leu Gly Leu  Ile Ser Leu
    1805                1810                1815

Tyr Asn  Glu Lys Phe Tyr Ile  Asn Asn Phe Gly Met  Met Val Ser
    1820                1825                1830

Gly Leu  Val Tyr Ile Asn Asp  Ser Leu Tyr Tyr Phe  Lys Pro Pro
    1835                1840                1845

Ile Lys  Asn Leu Ile Thr Gly  Phe Thr Thr Ile Gly  Asp Asp Lys
    1850                1855                1860

Tyr Tyr  Phe Asn Pro Asp Asn  Gly Gly Ala Ala Ser  Val Gly Glu
    1865                1870                1875

Thr Ile  Ile Asp Gly Lys Asn  Tyr Tyr Phe Ser Gln  Asn Gly Val
    1880                1885                1890

Leu Gln  Thr Gly Val Phe Ser  Thr Glu Asp Gly Phe  Lys Tyr Phe
    1895                1900                1905

Ala Pro  Ala Asp Thr Leu Asp  Glu Asn Leu Glu Gly  Glu Ala Ile
    1910                1915                1920

Asp Phe  Thr Gly Lys Leu Thr  Ile Asp Glu Asn Val  Tyr Tyr Phe
    1925                1930                1935
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Gly Asp  Asn Tyr Arg Ala Ala  Ile Glu Trp Gln Thr  Leu Asp Asp
    1940                1945                1950

Glu Val  Tyr Tyr Phe Ser Thr  Asp Thr Gly Arg Ala  Phe Lys Gly
    1955                1960                1965

Leu Asn  Gln Ile Gly Asp Asp  Lys Phe Tyr Phe Asn  Ser Asp Gly
    1970                1975                1980

Ile Met  Gln Lys Gly Phe Val  Asn Ile Asn Asp Lys  Thr Phe Tyr
    1985                1990                1995

Phe Asp  Asp Ser Gly Val Met  Lys Ser Gly Tyr Thr  Glu Ile Asp
    2000                2005                2010

Gly Lys  Tyr Phe Tyr Phe Ala  Glu Asn Gly Glu Met  Gln Ile Gly
    2015                2020                2025

Val Phe  Asn Thr Ala Asp Gly  Phe Lys Tyr Phe Ala  His His Asp
    2030                2035                2040

Glu Asp  Leu Gly Asn Glu Glu  Gly Glu Ala Leu Ser  Tyr Ser Gly
    2045                2050                2055

Ile Leu  Asn Phe Asn Asn Lys  Ile Tyr Tyr Phe Asp  Asp Ser Phe
    2060                2065                2070

Thr Ala  Val Val Gly Trp Lys  Asp Leu Glu Asp Gly  Ser Lys Tyr
    2075                2080                2085

Tyr Phe  Asp Glu Asp Thr Ala  Glu Ala Tyr Ile Gly  Ile Ser Ile
    2090                2095                2100

Ile Asn  Asp Gly Lys Tyr Tyr  Phe Asn Asp Ser Gly  Ile Met Gln
    2105                2110                2115

Ile Gly  Phe Val Thr Ile Asn  Asn Glu Val Phe Tyr  Phe Ser Asp
    2120                2125                2130
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Ser Gly  Ile Val Glu Ser Gly  Met Gln Asn Ile Asp  Asp Asn Tyr
    2135                2140                2145

Phe Tyr  Ile Asp Glu Asn Gly  Leu Val Gln Ile Gly  Val Phe Asp
    2150                2155                2160

Thr Ser  Asp Gly Tyr Lys Tyr  Phe Ala Pro Ala Asn  Thr Val Asn
    2165                2170                2175

Asp Asn  Ile Tyr Gly Gln Ala  Val Glu Tyr Ser Gly  Leu Val Arg
    2180                2185                2190

Val Gly  Glu Asp Val Tyr Tyr  Phe Gly Glu Thr Tyr  Thr Ile Glu
    2195                2200                2205

Thr Gly  Trp Ile Tyr Asp Met  Glu Asn Glu Ser Asp  Lys Tyr Tyr
    2210                2215                2220

Phe Asp  Pro Glu Thr Lys Lys  Ala Tyr Lys Gly Ile  Asn Val Ile
    2225                2230                2235

Asp Asp  Ile Lys Tyr Tyr Phe  Asp Glu Asn Gly Ile  Met Arg Thr
    2240                2245                2250

Gly Leu  Ile Thr Phe Glu Asp  Asn His Tyr Tyr Phe  Asn Glu Asp
    2255                2260                2265

Gly Ile  Met Gln Tyr Gly Tyr  Leu Asn Ile Glu Asp  Lys Thr Phe
    2270                2275                2280

Tyr Phe  Ser Glu Asp Gly Ile  Met Gln Ile Gly Val  Phe Asn Thr
    2285                2290                2295

Pro Asp  Gly Phe Lys Tyr Phe  Ala His Gln Asn Thr  Leu Asp Glu
    2300                2305                2310

Asn Phe  Glu Gly Glu Ser Ile  Asn Tyr Thr Gly Trp  Leu Asp Leu
    2315                2320                2325
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Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr
2330 2335 2340

Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp
2345 2350 2355

Thr Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 120
<211> 2366
<212> PRT
<213> Clostridium difficile

<400> 120

Met Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg
1 5 10 15

Phe Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
20 25 30

Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
35 40 45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
50 55 60

Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65 70 75 80

Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys
85 90 95

Asn Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
100 105 110

Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
115 120 125

Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr

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    130                 135                 140

Val Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145                 150                 155                 160

Leu Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met
                165                 170                 175

Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala
            180                 185                 190

Gln Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr
        195                 200                 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr
    210                 215                 220

Ile Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val
225                 230                 235                 240

Arg Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu
                245                 250                 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu
            260                 265                 270

Arg Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp
        275                 280                 285

Met Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro
    290                 295                 300

Ser Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile
305                 310                 315                 320

Met Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp
                325                 330                 335

Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
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340 345 350

Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala
355 360 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn
370 375 380

Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val
385 390 395 400

Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro
405 410 415

Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile
420 425 430

Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met
435 440 445

Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr
450 455 460

Thr Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp
465 470 475 480

Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala
485 490 495

Asp Leu Arg Asn Phe Glu Ile Phe Lys Thr Asn Ile Ser Gln Ser Thr
500 505 510

Glu Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys
515 520 525

Ala Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly
530 535 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu

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545                 550                 555                 560

Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly
                565                 570                 575

Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
            580                 585                 590

Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe
        595                 600                 605

Gln Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly
    610                 615                 620

Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile
625                 630                 635                 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp
                645                 650                 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser
            660                 665                 670

Thr Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro
        675                 680                 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser
    690                 695                 700

Ile Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys
705                 710                 715                 720

Asp Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
                725                 730                 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg
            740                 745                 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
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        755                 760                 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
    770                 775                 780

Asn Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785                 790                 795                 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu
                805                 810                 815

Glu Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
            820                 825                 830

Asp Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr
        835                 840                 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser
    850                 855                 860

Ile Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp
865                 870                 875                 880

Ser His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe
                885                 890                 895

Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
            900                 905                 910

Thr Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu
        915                 920                 925

Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
    930                 935                 940

Val Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn
945                 950                 955                 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu
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                965                 970                 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
            980                 985                 990

Leu Phe Ser Thr Gly Leu Asn Thr  Ile Thr Asp Ala Ala  Lys Val Val
        995                 1000                1005

Glu Leu  Val Ser Thr Ala Leu  Asp Glu Thr Ile Asp  Leu Leu Pro
    1010                1015                1020

Thr Leu  Ser Glu Gly Leu Pro  Ile Ile Ala Thr Ile  Ile Asp Gly
    1025                1030                1035

Val Ser  Leu Gly Ala Ala Ile  Lys Glu Leu Ser Glu  Thr Ser Asp
    1040                1045                1050

Pro Leu  Leu Arg Gln Glu Ile  Glu Ala Lys Ile Gly  Ile Met Ala
    1055                1060                1065

Val Asn  Leu Thr Thr Ala Thr  Thr Ala Ile Ile Thr  Ser Ser Leu
    1070                1075                1080

Gly Ile  Ala Ser Gly Phe Ser  Ile Leu Leu Val Pro  Leu Ala Gly
    1085                1090                1095

Ile Ser  Ala Gly Ile Pro Ser  Leu Val Asn Asn Glu  Leu Val Leu
    1100                1105                1110

Arg Asp  Lys Ala Thr Lys Val  Val Asp Tyr Phe Lys  His Val Ser
    1115                1120                1125

Leu Val  Glu Thr Glu Gly Val  Phe Thr Leu Leu Asp  Asp Lys Ile
    1130                1135                1140

Met Met  Pro Gln Asp Asp Leu  Val Ile Ser Glu Ile  Asp Phe Asn
    1145                1150                1155

Asn Asn  Ser Ile Val Leu Gly  Lys Cys Glu Ile Trp  Arg Met Glu
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1160 1165 1170

Gly Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe
1175 1180 1185

Ser Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr
1190 1195 1200

Asp Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp
1205 1210 1215

Leu Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu
1220 1225 1230

Thr Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr
1235 1240 1245

Lys Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr
1250 1255 1260

Trp Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu
1265 1270 1275

Lys Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser
1280 1285 1290

Asn Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile
1295 1300 1305

Arg Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr
1310 1315 1320

Ala Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu
1325 1330 1335

Ser Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg
1340 1345 1350

Asp Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile

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1355 1360 1365

Glu Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile
1370 1375 1380

Leu Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser
1385 1390 1395

Asn Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn
1400 1405 1410

Ala Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu
1415 1420 1425

Ile Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile
1430 1435 1440

Gln Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys
1445 1450 1455

Asn Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly
1460 1465 1470

Phe Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu
1475 1480 1485

Pro Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys
1490 1495 1500

Pro Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val
1505 1510 1515

Ile Thr Lys Asp Asn Val Asn Ile Leu Thr Asp Tyr Tyr Leu Lys
1520 1525 1530

Asp Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys
1535 1540 1545

Thr Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala

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1550 1555 1560

Glu Ile Leu Lys Phe Met Asn Arg Lys Gly Asn Thr Asn Thr Ser
1565 1570 1575

Asp Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile
1580 1585 1590

Phe Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala
1595 1600 1605

Asn Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe
1610 1615 1620

Ile Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe
1625 1630 1635

Asn Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln
1640 1645 1650

Asn Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp
1655 1660 1665

Ile Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly
1670 1675 1680

Ile Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr
1685 1690 1695

Thr Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr
1700 1705 1710

Tyr Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys
1715 1720 1725

Ile Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser
1730 1735 1740

Asn Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn

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1745 1750 1755

Lys Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp
1760 1765 1770

Lys Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln
1775 1780 1785

Asp Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr
1790 1795 1800

Tyr Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu
1805 1810 1815

Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser
1820 1825 1830

Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro
1835 1840 1845

Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys
1850 1855 1860

Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu
1865 1870 1875

Thr Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val
1880 1885 1890

Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
1895 1900 1905

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile
1910 1915 1920

Asp Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe
1925 1930 1935

Asp Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly

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1940 1945 1950

Glu Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly
1955 1960 1965

Leu Asn Gln Ile Gly Asp Tyr Lys Tyr Tyr Phe Asn Ser Asp Gly
1970 1975 1980

Val Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr
1985 1990 1995

Phe Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp
2000 2005 2010

Gly Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly
2015 2020 2025

Val Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn
2030 2035 2040

Glu Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly
2045 2050 2055

Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe
2060 2065 2070

Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr
2075 2080 2085

Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu
2090 2095 2100

Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln
2105 2110 2115

Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp
2120 2125 2130

Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr

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2135 2140 2145

Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp
2150 2155 2160

Thr Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn
2165 2170 2175

Asp Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg
2180 2185 2190

Val Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu
2195 2200 2205

Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile
2225 2230 2235

Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr
2240 2245 2250

Gly Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn
2255 2260 2265

Gly Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe
2270 2275 2280

Tyr Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr
2285 2290 2295

Pro Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu
2300 2305 2310

Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu
2315 2320 2325

Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr

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2330 2335 2340

Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp
2345 2350 2355

Thr Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 121
<211> 2367
<212> PRT
<213> Clostridium difficile

<400> 121

Met Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg
1 5 10 15

Phe Arg Val Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
20 25 30

Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
35 40 45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Thr Tyr Ile Asp Thr Tyr Lys
50 55 60

Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65 70 75 80

Ile Glu Ile Leu Glu Leu Lys Asn Ser Asn Leu Thr Pro Val Glu Lys
85 90 95

Asn Leu His Phe Ile Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
100 105 110

Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
115 120 125

Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
130 135 140

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```
Ile Ile Glu Ser Ala Ser Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145                 150                 155                 160

Leu Asn Asp Pro Glu Phe Asn His Thr Ala Phe Phe Arg Lys Arg Met
                165                 170                 175

Gln Ile Ile Tyr Asp Lys Gln Gln Asn Phe Ile Asn Tyr Tyr Lys Ala
            180                 185                 190

Gln Lys Glu Glu Asn Pro Asp Leu Ile Ile Asp Asp Ile Val Lys Thr
        195                 200                 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Asp Ile Asp Glu Leu Asn Ala Tyr
    210                 215                 220

Ile Glu Glu Ser Leu Asn Lys Val Thr Glu Asn Ser Gly Asn Asp Val
225                 230                 235                 240

Arg Asn Phe Glu Glu Phe Lys Thr Gly Glu Val Phe Asn Leu Tyr Glu
                245                 250                 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Gly Ala Ser Asp Ile Leu
            260                 265                 270

Arg Val Ala Ile Leu Lys Asn Ile Gly Gly Val Tyr Leu Asp Val Asp
        275                 280                 285

Met Leu Pro Gly Ile His Pro Asp Leu Phe Lys Asp Ile Asn Lys Pro
    290                 295                 300

Asp Ser Val Lys Thr Ala Val Asp Trp Glu Glu Met Gln Leu Glu Ala
305                 310                 315                 320

Ile Met Lys His Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Lys His Phe
                325                 330                 335

Asp Thr Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala
            340                 345                 350
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Ser Lys Ser Asp Lys Ser Glu Ile Phe Leu Pro Leu Gly Asp Ile Glu
        355                 360                 365

Val Ser Pro Leu Glu Val Lys Ile Ala Phe Ala Lys Gly Ser Ile Ile
    370                 375                 380

Asn Gln Ala Leu Ile Ser Ala Lys Asp Ser Tyr Cys Ser Asp Leu Leu
385                 390                 395                 400

Ile Lys Gln Ile Gln Asn Arg Tyr Lys Ile Leu Asn Asp Thr Leu Gly
                405                 410                 415

Pro Ile Ile Ser Gln Gly Asn Asp Phe Asn Thr Thr Met Asn Asn Phe
            420                 425                 430

Gly Glu Ser Leu Gly Ala Ile Ala Asn Glu Glu Asn Ile Ser Phe Ile
        435                 440                 445

Ala Lys Ile Gly Ser Tyr Leu Arg Val Gly Phe Tyr Pro Glu Ala Asn
    450                 455                 460

Thr Thr Ile Thr Leu Ser Gly Pro Thr Ile Tyr Ala Gly Ala Tyr Lys
465                 470                 475                 480

Asp Leu Leu Thr Phe Lys Glu Met Ser Ile Asp Thr Ser Ile Leu Ser
                485                 490                 495

Ser Glu Leu Arg Asn Phe Glu Phe Pro Lys Val Asn Ile Ser Gln Ala
            500                 505                 510

Thr Glu Gln Glu Lys Asn Ser Leu Trp Gln Phe Asn Glu Glu Arg Ala
        515                 520                 525

Lys Ile Gln Phe Glu Glu Tyr Lys Lys Asn Tyr Phe Glu Gly Ala Leu
    530                 535                 540

Gly Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Thr Val Thr Asp Lys
545                 550                 555                 560
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Glu Tyr Leu Leu Glu Lys Ile Ser Ser Ser Thr Lys Ser Ser Glu Arg
565 570 575

Gly Tyr Val His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr
580 585 590

Glu Ala Ala Cys Asn Leu Phe Ala Lys Asn Pro Tyr Asp Ser Ile Leu
595 600 605

Phe Gln Lys Asn Ile Glu Asp Ser Glu Val Ala Tyr Tyr Tyr Asn Pro
610 615 620

Thr Asp Ser Glu Ile Gln Glu Ile Asp Lys Tyr Arg Ile Pro Asp Arg
625 630 635 640

Ile Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys
645 650 655

Ala Glu Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu
660 665 670

Ser Ser Glu Ile Glu Thr Ala Ile Gly Leu Ala Lys Glu Asp Ile Ser
675 680 685

Pro Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr
690 695 700

Ser Val Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Arg Val
705 710 715 720

Lys Asp Lys Val Ser Glu Leu Met Pro Ser Met Ser Gln Asp Ser Ile
725 730 735

Ile Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
740 745 750

Arg Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser
755 760 765

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```
Ile Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys
    770                 775                 780

Glu Asn Lys Ile Ile Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr
785                 790                 795                 800

Leu Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu
                805                 810                 815

Glu Glu Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn
            820                 825                 830

Ile Glu Thr Gln Val Val Glu Glu Arg Ile Glu Glu Ala Lys Ser Leu
        835                 840                 845

Thr Ser Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu
    850                 855                 860

Ser Ile Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu
865                 870                 875                 880

Asp Ser His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly
                885                 890                 895

Phe Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val
            900                 905                 910

Glu Thr Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu
        915                 920                 925

Glu Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys
    930                 935                 940

Leu Val Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu
945                 950                 955                 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys
                965                 970                 975
```

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```
Glu Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala
            980                 985                 990

Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Thr Asp Ala  Ala Lys Val
        995                 1000                1005

Val Glu  Leu Val Ser Thr Ala  Leu Asp Glu Thr Ile  Asp Leu Leu
    1010                1015                1020

Pro Thr  Leu Ser Glu Gly Leu  Pro Ile Ile Ala Thr  Ile Ile Asp
    1025                1030                1035

Gly Val  Ser Leu Gly Ala Ala  Ile Lys Glu Leu Ser  Glu Thr Ser
    1040                1045                1050

Asp Pro  Leu Leu Arg Gln Glu  Ile Glu Ala Lys Ile  Gly Ile Met
    1055                1060                1065

Ala Val  Asn Leu Thr Thr Ala  Thr Thr Ala Ile Ile  Thr Ser Ser
    1070                1075                1080

Leu Gly  Ile Ala Ser Gly Phe  Ser Ile Leu Leu Val  Pro Leu Ala
    1085                1090                1095

Gly Ile  Ser Ala Gly Ile Pro  Ser Leu Val Asn Asn  Glu Leu Val
    1100                1105                1110

Leu Arg  Asp Lys Ala Thr Lys  Val Val Asp Tyr Phe  Lys His Val
    1115                1120                1125

Ser Leu  Val Glu Thr Glu Gly  Val Phe Thr Leu Leu  Asp Asp Lys
    1130                1135                1140

Val Met  Met Pro Gln Asp Asp  Leu Val Ile Ser Glu  Ile Asp Phe
    1145                1150                1155

Asn Asn  Asn Ser Ile Val Leu  Gly Lys Cys Glu Ile  Trp Arg Met
    1160                1165                1170
```

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```
Glu Gly  Gly Ser Gly His Thr  Val Thr Asp Asp Ile  Asp His Phe
    1175                1180                1185

Phe Ser  Ala Pro Ser Ile Thr  Tyr Arg Glu Pro His  Leu Ser Ile
    1190                1195                1200

Tyr Asp  Val Leu Glu Val Gln  Lys Glu Glu Leu Asp  Leu Ser Lys
    1205                1210                1215

Asp Leu  Met Val Leu Pro Asn  Ala Pro Asn Arg Val  Phe Ala Trp
    1220                1225                1230

Glu Thr  Gly Trp Thr Pro Gly  Leu Arg Ser Leu Glu  Asn Asp Gly
    1235                1240                1245

Thr Lys  Leu Leu Asp Arg Ile  Arg Asp Asn Tyr Glu  Gly Glu Phe
    1250                1255                1260

Tyr Trp  Arg Tyr Phe Ala Phe  Ile Ala Asp Ala Leu  Ile Thr Thr
    1265                1270                1275

Leu Lys  Pro Arg Tyr Glu Asp  Thr Asn Ile Arg Ile  Asn Leu Asp
    1280                1285                1290

Ser Asn  Thr Arg Ser Phe Ile  Val Pro Ile Ile Thr  Thr Glu Tyr
    1295                1300                1305

Ile Arg  Glu Lys Leu Ser Tyr  Ser Phe Tyr Gly Ser  Gly Gly Thr
    1310                1315                1320

Tyr Ala  Leu Ser Leu Ser Gln  Tyr Asn Met Gly Ile  Asn Ile Glu
    1325                1330                1335

Leu Ser  Glu Ser Asp Val Trp  Ile Ile Asp Val Asp  Asn Val Val
    1340                1345                1350

Arg Asp  Val Thr Ile Glu Ser  Asp Lys Ile Lys Lys  Gly Asp Leu
    1355                1360                1365
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Ile Glu Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile
1370 1375 1380

Ile Leu Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly
1385 1390 1395

Ser Asn Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile
1400 1405 1410

Asn Ala Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu
1415 1420 1425

Leu Ile Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His
1430 1435 1440

Ile Gln Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln
1445 1450 1455

Lys Asn Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn
1460 1465 1470

Gly Phe Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu
1475 1480 1485

Leu Pro Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser
1490 1495 1500

Lys Pro Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys
1505 1510 1515

Val Ile Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu
1520 1525 1530

Lys Asp Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu
1535 1540 1545

Lys Thr Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val
1550 1555 1560

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```
Ala Glu  Ile Leu Lys Phe Met  Asn Arg Lys Gly Ser  Thr Asn Thr
    1565                1570                1575

Ser Asp  Ser Leu Met Ser Phe  Leu Glu Ser Met Asn  Ile Lys Ser
    1580                1585                1590

Ile Phe  Val Asn Phe Leu Gln  Ser Asn Ile Lys Phe  Ile Leu Asp
    1595                1600                1605

Ala Asn  Phe Ile Ile Ser Gly  Thr Thr Ser Ile Gly  Gln Phe Glu
    1610                1615                1620

Phe Ile  Cys Asp Glu Asn Asn  Asn Ile Gln Pro Tyr  Phe Ile Lys
    1625                1630                1635

Phe Asn  Thr Leu Glu Thr Asn  Tyr Thr Leu Tyr Val  Gly Asn Arg
    1640                1645                1650

Gln Asn  Met Ile Val Glu Pro  Asn Tyr Asp Leu Asp  Asp Ser Gly
    1655                1660                1665

Asp Ile  Ser Ser Thr Val Ile  Asn Phe Ser Gln Lys  Tyr Leu Tyr
    1670                1675                1680

Gly Ile  Asp Ser Cys Val Asn  Lys Val Val Ile Ser  Pro Asn Ile
    1685                1690                1695

Tyr Thr  Asp Glu Ile Asn Ile  Thr Pro Val Tyr Glu  Thr Asn Asn
    1700                1705                1710

Thr Tyr  Pro Glu Val Ile Val  Leu Asp Ala Asn Tyr  Ile Asn Glu
    1715                1720                1725

Lys Ile  Asn Val Asn Ile Asn  Asp Leu Ser Ile Arg  Tyr Val Trp
    1730                1735                1740

Ser Asn  Asp Gly Asn Asp Phe  Ile Leu Met Ser Thr  Ser Glu Glu
    1745                1750                1755
```

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```
Asn Lys  Val Ser Gln Val Lys  Ile Arg Phe Val Asn  Val Phe Lys
    1760                1765                1770

Asp Lys  Thr Leu Ala Asn Lys  Leu Ser Phe Asn Phe  Ser Asp Lys
    1775                1780                1785

Gln Asp  Val Pro Val Ser Glu  Ile Ile Leu Ser Phe  Thr Pro Ser
    1790                1795                1800

Tyr Tyr  Glu Asp Gly Leu Ile  Gly Tyr Asp Leu Gly  Leu Val Ser
    1805                1810                1815

Leu Tyr  Asn Glu Lys Phe Tyr  Ile Asn Asn Phe Gly  Met Met Val
    1820                1825                1830

Ser Gly  Leu Ile Tyr Ile Asn  Asp Ser Leu Tyr Tyr  Phe Lys Pro
    1835                1840                1845

Pro Val  Asn Asn Leu Ile Thr  Gly Phe Val Thr Val  Gly Asp Asp
    1850                1855                1860

Lys Tyr  Tyr Phe Asn Pro Ile  Asn Gly Gly Ala Ala  Ser Ile Gly
    1865                1870                1875

Glu Thr  Ile Ile Asp Asp Lys  Asn Tyr Tyr Phe Asn  Gln Ser Gly
    1880                1885                1890

Val Leu  Gln Thr Gly Val Phe  Ser Thr Glu Asp Gly  Phe Lys Tyr
    1895                1900                1905

Phe Ala  Pro Ala Asn Thr Leu  Asp Glu Asn Leu Glu  Gly Glu Ala
    1910                1915                1920

Ile Asp  Phe Thr Gly Lys Leu  Ile Ile Asp Glu Asn  Ile Tyr Tyr
    1925                1930                1935

Phe Glu  Asp Asn Tyr Arg Gly  Ala Val Glu Trp Lys  Glu Leu Asp
    1940                1945                1950
```

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Gly Glu Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys
1955 1960 1965

Gly Leu Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp
1970 1975 1980

Gly Val Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His
1985 1990 1995

Tyr Phe Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile
2000 2005 2010

Asp Gly Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile
2015 2020 2025

Gly Val Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His
2030 2035 2040

Asn Glu Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser
2045 2050 2055

Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser
2060 2065 2070

Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys
2075 2080 2085

Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser
2090 2095 2100

Leu Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met
2105 2110 2115

Gln Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser
2120 2125 2130

Asp Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn
2135 2140 2145

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Tyr Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe
2150 2155 2160

Asp Thr Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val
2165 2170 2175

Asn Asp Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val
2180 2185 2190

Arg Val Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile
2195 2200 2205

Glu Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr
2210 2215 2220

Tyr Phe Asp Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu
2225 2230 2235

Ile Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg
2240 2245 2250

Thr Gly Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu
2255 2260 2265

Asn Gly Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met
2270 2275 2280

Phe Tyr Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn
2285 2290 2295

Thr Pro Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp
2300 2305 2310

Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp
2315 2320 2325

Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala
2330 2335 2340

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Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro
    2345   2350   2355

Asp Thr Ala Gln Leu Val Ile Ser Glu
    2360   2365

<210> 122
<211> 2366
<212> PRT
<213> Clostridium difficile

<400> 122

Met Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg
1   5   10   15

Phe Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
            20   25   30

Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
        35   40   45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
    50   55   60

Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65   70   75   80

Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys
                85   90   95

Asn Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
            100   105   110

Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
        115   120   125

Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
    130   135   140

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```
Val Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145                 150                 155                 160

Leu Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met
                165                 170                 175

Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala
            180                 185                 190

Gln Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr
        195                 200                 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr
    210                 215                 220

Ile Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val
225                 230                 235                 240

Arg Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu
                245                 250                 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu
            260                 265                 270

Arg Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp
        275                 280                 285

Met Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro
    290                 295                 300

Ser Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile
305                 310                 315                 320

Met Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp
                325                 330                 335

Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
            340                 345                 350
```

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```
Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala
        355                 360                 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn
    370                 375                 380

Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val
385                 390                 395                 400

Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro
                405                 410                 415

Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile
            420                 425                 430

Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met
        435                 440                 445

Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr
    450                 455                 460

Thr Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp
465                 470                 475                 480

Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala
                485                 490                 495

Asp Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr
            500                 505                 510

Glu Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys
        515                 520                 525

Ala Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly
    530                 535                 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu
545                 550                 555                 560
```

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```
Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly
                565                 570                 575

Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
            580                 585                 590

Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe
        595                 600                 605

Gln Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly
    610                 615                 620

Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile
625                 630                 635                 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp
                645                 650                 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser
            660                 665                 670

Thr Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro
        675                 680                 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser
    690                 695                 700

Ile Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys
705                 710                 715                 720

Asp Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
                725                 730                 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg
            740                 745                 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
        755                 760                 765
```

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```
Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
    770                 775                 780

Asn Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785                 790                 795                 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu
                805                 810                 815

Glu Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
            820                 825                 830

Asp Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr
        835                 840                 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser
    850                 855                 860

Ile Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp
865                 870                 875                 880

Ser His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe
                885                 890                 895

Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
            900                 905                 910

Thr Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu
        915                 920                 925

Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
    930                 935                 940

Val Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn
945                 950                 955                 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu
                965                 970                 975
```

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```
Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
            980                 985                 990

Leu Phe Ser Thr Gly Leu Asn Thr  Ile Thr Asp Ala Ala  Lys Val Val
        995                 1000                1005

Glu Leu  Val Ser Thr Ala Leu  Asp Glu Thr Ile Asp  Leu Leu Pro
    1010                1015                1020

Thr Leu  Ser Glu Gly Leu Pro  Ile Ile Ala Thr Ile  Ile Asp Gly
    1025                1030                1035

Val Ser  Leu Gly Ala Ala Ile  Lys Glu Leu Ser Glu  Thr Ser Asp
    1040                1045                1050

Pro Leu  Leu Arg Gln Glu Ile  Glu Ala Lys Ile Gly  Ile Met Ala
    1055                1060                1065

Val Asn  Leu Thr Thr Ala Thr  Thr Ala Ile Ile Thr  Ser Ser Leu
    1070                1075                1080

Gly Val  Ala Ser Gly Phe Ser  Ile Leu Leu Val Pro  Leu Ala Gly
    1085                1090                1095

Ile Ser  Ala Gly Ile Pro Ser  Leu Val Asn Asn Glu  Leu Val Leu
    1100                1105                1110

Arg Asp  Lys Ala Thr Lys Val  Val Asp Tyr Phe Lys  His Val Ser
    1115                1120                1125

Leu Val  Glu Thr Glu Gly Val  Phe Thr Leu Leu Asp  Asp Lys Ile
    1130                1135                1140

Met Met  Pro Gln Asp Asp Leu  Val Ile Ser Glu Ile  Asp Phe Asn
    1145                1150                1155

Asn Asn  Ser Ile Val Leu Gly  Lys Cys Glu Ile Trp  Arg Met Glu
    1160                1165                1170
```

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```
Gly Gly  Ser Gly His Thr Val  Thr Asp Asp Ile Asp  His Phe Phe
    1175                1180                1185

Ser Ala  Pro Ser Ile Thr Tyr  Arg Glu Pro His Leu  Ser Ile Tyr
    1190                1195                1200

Asp Val  Leu Glu Val Gln Lys  Glu Glu Leu Asp Leu  Ser Lys Asp
    1205                1210                1215

Leu Met  Val Leu Pro Asn Ala  Pro Asn Arg Val Phe  Ala Trp Glu
    1220                1225                1230

Thr Gly  Trp Thr Pro Gly Leu  Arg Ser Leu Glu Asn  Asp Gly Thr
    1235                1240                1245

Lys Leu  Leu Asp Arg Ile Arg  Asp Asn Tyr Glu Gly  Glu Phe Tyr
    1250                1255                1260

Trp Arg  Tyr Phe Ala Phe Ile  Ala Asp Ala Leu Ile  Thr Thr Leu
    1265                1270                1275

Lys Pro  Arg Tyr Glu Asp Thr  Asn Ile Arg Ile Asn  Leu Asp Ser
    1280                1285                1290

Asn Thr  Arg Ser Phe Ile Val  Pro Ile Ile Thr Thr  Glu Tyr Ile
    1295                1300                1305

Arg Glu  Lys Leu Ser Tyr Ser  Phe Tyr Gly Ser Gly  Gly Thr Tyr
    1310                1315                1320

Ala Leu  Ser Leu Ser Gln Tyr  Asn Met Gly Ile Asn  Ile Glu Leu
    1325                1330                1335

Ser Glu  Ser Asp Val Trp Ile  Ile Asp Val Asp Asn  Val Val Arg
    1340                1345                1350

Asp Val  Thr Ile Glu Ser Asp  Lys Ile Lys Lys Gly  Asp Leu Ile
    1355                1360                1365
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Glu Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile
1370 1375 1380

Leu Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser
1385 1390 1395

Asn Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn
1400 1405 1410

Ala Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu
1415 1420 1425

Ile Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile
1430 1435 1440

Gln Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys
1445 1450 1455

Asn Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly
1460 1465 1470

Phe Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu
1475 1480 1485

Pro Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys
1490 1495 1500

Pro Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val
1505 1510 1515

Ile Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys
1520 1525 1530

Asp Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys
1535 1540 1545

Thr Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala
1550 1555 1560

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Glu Ile Leu Lys Phe Met Asn Arg Lys Gly Asn Thr Asn Thr Ser
1565 1570 1575

Asp Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile
1580 1585 1590

Phe Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala
1595 1600 1605

Asn Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe
1610 1615 1620

Ile Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe
1625 1630 1635

Asn Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln
1640 1645 1650

Asn Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp
1655 1660 1665

Ile Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly
1670 1675 1680

Ile Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr
1685 1690 1695

Thr Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr
1700 1705 1710

Tyr Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys
1715 1720 1725

Ile Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser
1730 1735 1740

Asn Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn
1745 1750 1755

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Lys Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp
1760 1765 1770

Lys Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln
1775 1780 1785

Asp Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr
1790 1795 1800

Tyr Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu
1805 1810 1815

Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser
1820 1825 1830

Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro
1835 1840 1845

Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys
1850 1855 1860

Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu
1865 1870 1875

Thr Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val
1880 1885 1890

Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
1895 1900 1905

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile
1910 1915 1920

Asp Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe
1925 1930 1935

Asp Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly
1940 1945 1950

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Glu Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly
1955 1960 1965

Leu Asn Gln Ile Gly Asp Tyr Lys Tyr Tyr Phe Asn Ser Asp Gly
1970 1975 1980

Val Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr
1985 1990 1995

Phe Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp
2000 2005 2010

Gly Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly
2015 2020 2025

Val Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn
2030 2035 2040

Glu Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly
2045 2050 2055

Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe
2060 2065 2070

Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr
2075 2080 2085

Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu
2090 2095 2100

Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln
2105 2110 2115

Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp
2120 2125 2130

Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
2135 2140 2145

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Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp
2150 2155 2160

Thr Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn
2165 2170 2175

Asp Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg
2180 2185 2190

Val Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu
2195 2200 2205

Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile
2225 2230 2235

Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr
2240 2245 2250

Gly Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn
2255 2260 2265

Gly Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe
2270 2275 2280

Tyr Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr
2285 2290 2295

Pro Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu
2300 2305 2310

Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu
2315 2320 2325

Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr
2330 2335 2340

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Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp
2345 2350 2355

Thr Ala Gln Leu Val Ile Ser Glu
2360 2365

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<211> 2366
<212> PRT
<213> Clostridium difficile

<400> 123

Met Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg
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Phe Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
20 25 30

Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
35 40 45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
50 55 60

Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65 70 75 80

Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys
85 90 95

Asn Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
100 105 110

Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
115 120 125

Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
130 135 140

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```
Ile Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145                 150                 155                 160

Leu Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met
                165                 170                 175

Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala
            180                 185                 190

Gln Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile
        195                 200                 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr
    210                 215                 220

Ile Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val
225                 230                 235                 240

Arg Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu
                245                 250                 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu
            260                 265                 270

Arg Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp
        275                 280                 285

Met Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro
    290                 295                 300

Ser Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile
305                 310                 315                 320

Met Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp
                325                 330                 335

Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser
            340                 345                 350
```

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```
Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala
        355                 360                 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn
    370                 375                 380

Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val
385                 390                 395                 400

Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro
                405                 410                 415

Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile
            420                 425                 430

Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met
        435                 440                 445

Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr
    450                 455                 460

Thr Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp
465                 470                 475                 480

Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala
                485                 490                 495

Asp Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr
            500                 505                 510

Glu Gln Glu Met Ala Ser Leu Trp Thr Phe Asp Asp Ala Arg Ala Lys
        515                 520                 525

Val Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly
    530                 535                 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu
545                 550                 555                 560
```

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```
Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly
                565                 570                 575

Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
            580                 585                 590

Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Ile Leu Phe
        595                 600                 605

Gln Lys Asn Ile Glu Asn Ser Glu Val Ala Tyr Tyr Tyr Asn Pro Gly
    610                 615                 620

Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Arg Ile Pro Ser Ile Ile
625                 630                 635                 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp
                645                 650                 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser
            660                 665                 670

Thr Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Ser
        675                 680                 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser
    690                 695                 700

Ile Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys
705                 710                 715                 720

Asp Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
                725                 730                 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Asn Glu Gly Arg Arg
            740                 745                 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
        755                 760                 765
```

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```
Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
    770                 775                 780

Asn Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785                 790                 795                 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Leu Ser Asp Ile Glu Leu Glu
                805                 810                 815

Glu Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
            820                 825                 830

Asp Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr
        835                 840                 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser
    850                 855                 860

Ile Ser Asp Ser Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Asp Asp
865                 870                 875                 880

Ser His Phe Ile Ser Phe Glu Asp Ile Ser Lys Thr Glu Asp Gly Phe
                885                 890                 895

Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
            900                 905                 910

Thr Glu Lys Glu Ile Phe Ser Glu Tyr Ala Asn His Ile Glu Arg Glu
        915                 920                 925

Ile Ser Asn Ile Lys Asp Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
    930                 935                 940

Val Lys Lys Val Asn Leu Asp Ala Ile His Glu Val Asn Thr Leu Asn
945                 950                 955                 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Gly Tyr Ser Ser Ser Lys Glu
                965                 970                 975
```

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```
Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
            980                 985                 990

Leu Phe Ser Thr Gly Leu Asn Thr  Ile Thr Asp Ala Ala  Lys Val Val
        995                 1000                1005

Glu Leu  Val Ser Thr Ala Leu  Asp Glu Thr Ile Asp  Leu Leu Pro
    1010                1015                1020

Thr Leu  Ser Glu Gly Leu Pro  Val Ile Ala Thr Ile  Ile Asp Gly
    1025                1030                1035

Val Ser  Leu Gly Ala Ala Ile  Lys Glu Leu Ser Glu  Thr Ser Asp
    1040                1045                1050

Pro Leu  Leu Arg Gln Glu Ile  Glu Ala Lys Ile Gly  Ile Met Ala
    1055                1060                1065

Val Asn  Leu Thr Ala Ala Thr  Thr Ala Ile Ile Thr  Ser Ser Leu
    1070                1075                1080

Gly Ile  Ala Ser Gly Phe Ser  Ile Leu Leu Val Pro  Leu Ala Gly
    1085                1090                1095

Ile Ser  Ala Gly Ile Pro Ser  Leu Val Asn Asn Glu  Leu Val Leu
    1100                1105                1110

Arg Asp  Lys Ala Thr Lys Val  Val Asp Tyr Phe Lys  His Ile Ser
    1115                1120                1125

Leu Val  Glu Thr Glu Gly Ala  Phe Thr Leu Leu Asp  Asp Lys Ile
    1130                1135                1140

Met Ile  Pro Gln Asp Asp Leu  Val Ile Ser Glu Ile  Asp Phe Asn
    1145                1150                1155

Asn Asn  Ser Ile Val Leu Gly  Lys Cys Glu Ile Trp  Arg Met Glu
    1160                1165                1170
```

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```
Gly Gly  Ser Gly His Thr Val  Thr Asn Asp Ile Asp  His Phe Phe
    1175                1180                1185

Ser Ser  Pro Thr Ile Thr Tyr  Ile Lys Pro His Leu  Ser Ile Tyr
    1190                1195                1200

Asp Val  Leu Glu Val Gln Lys  Glu Glu Leu Asp Leu  Ser Lys Asp
    1205                1210                1215

Leu Met  Val Leu Pro Asn Ala  Pro Asn Arg Val Phe  Ala Trp Glu
    1220                1225                1230

Thr Gly  Trp Thr Pro Gly Leu  Arg Ser Leu Glu Asn  Glu Gly Thr
    1235                1240                1245

Lys Leu  Leu Asp Arg Ile Arg  Asp His Tyr Lys Gly  Glu Phe Tyr
    1250                1255                1260

Trp Arg  Tyr Phe Ala Phe Ile  Ala Asp Ala Leu Ile  Thr Thr Leu
    1265                1270                1275

Lys Pro  Arg Tyr Glu Asp Thr  Asn Ile Arg Ile Asn  Leu Asp Ser
    1280                1285                1290

Asn Asn  Arg Ser Phe Ile Val  Pro Ile Ile Thr Thr  Glu His Ile
    1295                1300                1305

Arg Glu  Lys Leu Ser Tyr Ser  Phe His Gly Ser Gly  Gly Thr Tyr
    1310                1315                1320

Ala Leu  Ser Leu Ser Gln Tyr  Asn Met Gly Ile Asn  Ile Glu Leu
    1325                1330                1335

Ser Glu  Ser Asp Val Trp Ile  Ile Asp Val Asp Asn  Val Val Arg
    1340                1345                1350

Asp Val  Thr Ile Asp Ser Asp  Lys Ile Lys Lys Gly  Asp Leu Ile
    1355                1360                1365
```

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```
Glu Gly  Ile Leu Ser Thr Leu  Ser Ile Glu Asp Asn  Lys Ile Ile
    1370                1375                1380

Leu Asn  His His Glu Ile Asn  Phe Ser Gly Asp Val  Asn Gly Ser
    1385                1390                1395

Asn Gly  Phe Ile Ser Leu Thr  Phe Ser Ile Leu Glu  Gly Ile Asn
    1400                1405                1410

Ala Ile  Ile Glu Val Asp Leu  Leu Ser Lys Ser Tyr  Lys Leu Leu
    1415                1420                1425

Ile Ser  Gly Glu Leu Lys Ile  Leu Met Leu Asn Ser  Asn His Ile
    1430                1435                1440

Gln Gln  Lys Ile Asp Tyr Ile  Gly Phe Asn Ser Glu  Leu Gln Lys
    1445                1450                1455

Asn Ile  Pro Tyr Ser Phe Val  Asp Ser Glu Gly Lys  Glu Asn Gly
    1460                1465                1470

Phe Ile  Asn Gly Ser Thr Lys  Glu Gly Leu Phe Val  Ser Glu Leu
    1475                1480                1485

Pro Asp  Val Val Leu Ile Ser  Lys Val Tyr Met Asp  Asp Ser Lys
    1490                1495                1500

Pro Ser  Phe Gly Tyr Tyr Ser  Asn Asn Leu Lys Asp  Val Lys Val
    1505                1510                1515

Ile Thr  Lys Asp Asn Val Asn  Ile Leu Thr Gly Tyr  Tyr Leu Lys
    1520                1525                1530

Asp Asp  Ile Lys Ile Ser Leu  Ser Phe Thr Leu Gln  Asp Glu Lys
    1535                1540                1545

Thr Ile  Lys Leu Asn Gly Val  His Leu Asp Glu Ser  Gly Val Ala
    1550                1555                1560
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Glu Ile Leu Lys Phe Met Asn Lys Lys Gly Ser Thr Asn Thr Ser
1565 1570 1575

Asp Ser Leu Met Ser Phe Leu Glu Ser Val Asn Ile Lys Ser Ile
1580 1585 1590

Phe Val Asn Phe Leu Gln Ser Lys Ile Asn Phe Ile Leu Asp Ala
1595 1600 1605

Asn Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe
1610 1615 1620

Ile Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe
1625 1630 1635

Asn Thr Leu Glu Thr Thr Tyr Thr Leu Tyr Val Gly Asn Arg Gln
1640 1645 1650

Asn Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp
1655 1660 1665

Ile Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly
1670 1675 1680

Ile Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr
1685 1690 1695

Thr Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Asn
1700 1705 1710

Tyr Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys
1715 1720 1725

Ile Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser
1730 1735 1740

Asn Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn
1745 1750 1755

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```
Lys Val  Ser Gln Val Lys Ile  Arg Phe Val Asn Val  Phe Lys Asp
    1760                1765                1770

Lys Thr  Leu Ala Asn Lys Leu  Ser Phe Asn Phe Ser  Asp Lys Gln
    1775                1780                1785

Asp Val  Pro Val Ser Glu Ile  Ile Ser Ala Phe Thr  Pro Ser Tyr
    1790                1795                1800

Tyr Glu  Asp Gly Leu Ile Gly  Tyr Asp Leu Gly Leu  Val Ser Leu
    1805                1810                1815

Tyr Asn  Glu Lys Phe Tyr Ile  Asn Asn Phe Gly Met  Met Val Ser
    1820                1825                1830

Gly Leu  Ile Tyr Ile Asn Asp  Ser Leu Tyr Tyr Phe  Lys Pro Pro
    1835                1840                1845

Val Asn  Asn Leu Ile Thr Gly  Phe Val Thr Val Gly  Asp Asp Lys
    1850                1855                1860

Tyr Tyr  Phe Asn Pro Thr Asn  Gly Gly Ala Ala Ser  Ile Gly Glu
    1865                1870                1875

Thr Ile  Ile Asn Asp Lys Asn  Tyr Tyr Phe Asn Gln  Ser Gly Ile
    1880                1885                1890

Leu Gln  Thr Gly Val Phe Ser  Thr Glu Asp Gly Leu  Lys Tyr Phe
    1895                1900                1905

Ala Pro  Ala Asn Thr Leu Asp  Glu Asn Leu Glu Gly  Glu Ala Ile
    1910                1915                1920

Asp Phe  Thr Gly Lys Leu Ile  Ile Asp Glu Asn Ile  Tyr Tyr Phe
    1925                1930                1935

Glu Asp  Asn Tyr Arg Gly Ala  Val Glu Trp Lys Glu  Leu Asp Gly
    1940                1945                1950
```

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```
Glu Met  Tyr Tyr Phe Ser Pro  Glu Thr Gly Lys Ala  Phe Lys Gly
    1955                1960                1965

Leu Asn  Gln Ile Gly Asp Asp  Lys Tyr Tyr Phe Asn  Ser Asp Gly
    1970                1975                1980

Ile Met  Gln Lys Gly Phe Val  Ser Ile Asn Asp Lys  Lys Tyr Tyr
    1985                1990                1995

Phe Asp  Asp Ser Gly Val Met  Lys Val Gly Tyr Ile  Glu Ile Asp
    2000                2005                2010

Gly Lys  Tyr Phe Tyr Phe Ala  Glu Asn Gly Glu Met  Gln Ile Gly
    2015                2020                2025

Val Phe  Asn Thr Ser Asp Gly  Phe Lys Tyr Phe Ala  His His Asn
    2030                2035                2040

Glu Asp  Leu Gly Asn Glu Glu  Gly Glu Ala Ile Ser  Tyr Ser Gly
    2045                2050                2055

Ile Leu  Asn Phe Asn Asn Lys  Ile Tyr Tyr Phe Asp  Tyr Ser Phe
    2060                2065                2070

Thr Ala  Val Val Gly Trp Lys  Asp Leu Glu Asp Gly  Ser Lys Tyr
    2075                2080                2085

Tyr Phe  Asp Glu Asp Thr Ala  Glu Ala Tyr Val Gly  Leu Ser Leu
    2090                2095                2100

Ile Asn  Asp Gly Gln Tyr Tyr  Phe Asn Asp Asp Gly  Ile Met Gln
    2105                2110                2115

Val Gly  Phe Val Thr Ile Asn  Asn Lys Val Phe Tyr  Phe Ser Asp
    2120                2125                2130

Ser Gly  Ile Ile Glu Ser Gly  Val Gln Asn Ile Asp  Asp Asn Tyr
    2135                2140                2145
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Phe Tyr Ile Asp Glu Lys Gly Ile Val Gln Ile Gly Val Phe Asp
2150 2155 2160

Thr Ser Asp Glu Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn
2165 2170 2175

Asp Asn Ile Tyr Gly Gln Ala Val Asp Tyr Ser Gly Leu Val Arg
2180 2185 2190

Val Gly Glu Asp Ile Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu
2195 2200 2205

Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile
2225 2230 2235

Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Asn Gly Ile Met Arg Thr
2240 2245 2250

Gly Leu Ile Ser Phe Glu Asn Asn Asp Tyr Tyr Phe Asn Glu Asn
2255 2260 2265

Gly Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe
2270 2275 2280

Tyr Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr
2285 2290 2295

Gln Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu
2300 2305 2310

Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu
2315 2320 2325

Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr
2330 2335 2340

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Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp
2345 2350 2355

Thr Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 124
<211> 2366
<212> PRT
<213> Clostridium difficile

<400> 124

Met Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg
1 5 10 15

Phe Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
20 25 30

Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
35 40 45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
50 55 60

Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65 70 75 80

Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys
85 90 95

Asn Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
100 105 110

Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
115 120 125

Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
130 135 140

Val Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn

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145                 150                 155                 160

Leu Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met
                165                 170                 175

Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala
            180                 185                 190

Gln Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr
        195                 200                 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr
    210                 215                 220

Ile Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val
225                 230                 235                 240

Arg Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu
                245                 250                 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu
            260                 265                 270

Arg Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp
        275                 280                 285

Met Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro
    290                 295                 300

Ser Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile
305                 310                 315                 320

Met Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp
                325                 330                 335

Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
            340                 345                 350

Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala
```

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        355                 360                 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn
    370                 375                 380

Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val
385                 390                 395                 400

Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro
                405                 410                 415

Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile
            420                 425                 430

Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met
        435                 440                 445

Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr
    450                 455                 460

Thr Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp
465                 470                 475                 480

Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala
                485                 490                 495

Asp Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr
            500                 505                 510

Glu Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys
        515                 520                 525

Ala Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly
    530                 535                 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu
545                 550                 555                 560

Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly
```

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565 570 575

Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
580 585 590

Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe
595 600 605

Gln Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly
610 615 620

Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile
625 630 635 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp
645 650 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser
660 665 670

Thr Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro
675 680 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser
690 695 700

Ile Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys
705 710 715 720

Asp Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
725 730 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg
740 745 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
755 760 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu

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770 775 780

Asn Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785 790 795 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu
805 810 815

Glu Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
820 825 830

Asp Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr
835 840 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser
850 855 860

Ile Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp
865 870 875 880

Ser His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe
885 890 895

Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
900 905 910

Thr Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu
915 920 925

Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
930 935 940

Val Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn
945 950 955 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu
965 970 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln

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980 985 990

Leu Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp Ala Ala Lys Val Val
995 1000 1005

Glu Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu Pro
1010 1015 1020

Thr Leu Ser Glu Gly Leu Pro Ile Ile Ala Thr Ile Ile Asp Gly
1025 1030 1035

Val Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp
1040 1045 1050

Pro Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala
1055 1060 1065

Val Asn Leu Thr Thr Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu
1070 1075 1080

Gly Ile Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly
1085 1090 1095

Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu
1100 1105 1110

Arg Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Val Ser
1115 1120 1125

Leu Val Glu Thr Glu Gly Val Phe Thr Leu Leu Asp Asp Lys Ile
1130 1135 1140

Met Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn
1145 1150 1155

Asn Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu
1160 1165 1170

Gly Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe

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1175 1180 1185

Ser Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr
1190 1195 1200

Asp Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp
1205 1210 1215

Leu Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu
1220 1225 1230

Thr Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr
1235 1240 1245

Lys Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr
1250 1255 1260

Trp Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu
1265 1270 1275

Lys Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser
1280 1285 1290

Asn Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile
1295 1300 1305

Arg Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr
1310 1315 1320

Ala Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu
1325 1330 1335

Ser Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg
1340 1345 1350

Asp Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile
1355 1360 1365

Glu Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile

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1370 1375 1380

Leu Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser
1385 1390 1395

Asn Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn
1400 1405 1410

Ala Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu
1415 1420 1425

Ile Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile
1430 1435 1440

Gln Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys
1445 1450 1455

Asn Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly
1460 1465 1470

Phe Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu
1475 1480 1485

Pro Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys
1490 1495 1500

Pro Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val
1505 1510 1515

Ile Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys
1520 1525 1530

Asp Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys
1535 1540 1545

Thr Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala
1550 1555 1560

Glu Ile Leu Lys Phe Met Asn Arg Lys Gly Asn Thr Asn Thr Ser

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1565 1570 1575

Asp Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile
1580 1585 1590

Phe Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala
1595 1600 1605

Asn Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe
1610 1615 1620

Ile Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe
1625 1630 1635

Asn Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln
1640 1645 1650

Asn Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp
1655 1660 1665

Ile Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly
1670 1675 1680

Ile Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr
1685 1690 1695

Thr Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr
1700 1705 1710

Tyr Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys
1715 1720 1725

Ile Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser
1730 1735 1740

Asn Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn
1745 1750 1755

Lys Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp

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1760 1765 1770

Lys Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln
1775 1780 1785

Asp Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr
1790 1795 1800

Tyr Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu
1805 1810 1815

Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser
1820 1825 1830

Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro
1835 1840 1845

Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys
1850 1855 1860

Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu
1865 1870 1875

Thr Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val
1880 1885 1890

Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
1895 1900 1905

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile
1910 1915 1920

Asp Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe
1925 1930 1935

Asp Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly
1940 1945 1950

Glu Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly

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1955 1960 1965

Leu Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly
1970 1975 1980

Val Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr
1985 1990 1995

Phe Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp
2000 2005 2010

Gly Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly
2015 2020 2025

Val Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn
2030 2035 2040

Glu Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly
2045 2050 2055

Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe
2060 2065 2070

Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr
2075 2080 2085

Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu
2090 2095 2100

Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln
2105 2110 2115

Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp
2120 2125 2130

Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
2135 2140 2145

Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp

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2150 2155 2160

Thr Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn
2165 2170 2175

Asp Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg
2180 2185 2190

Val Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu
2195 2200 2205

Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile
2225 2230 2235

Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr
2240 2245 2250

Gly Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn
2255 2260 2265

Gly Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe
2270 2275 2280

Tyr Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr
2285 2290 2295

Pro Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu
2300 2305 2310

Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu
2315 2320 2325

Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr
2330 2335 2340

Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp

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2345 2350 2355

Thr Ala Gln Leu Val Ile Ser Glu
2360 2365

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<211> 2366
<212> PRT
<213> Clostridium difficile

<400> 125

Met Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg
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Phe Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
20 25 30

Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
35 40 45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
50 55 60

Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65 70 75 80

Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys
85 90 95

Asn Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
100 105 110

Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
115 120 125

Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
130 135 140

Ile Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145 150 155 160

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```
Leu Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met
                165                 170                 175

Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala
            180                 185                 190

Gln Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile
        195                 200                 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr
    210                 215                 220

Ile Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val
225                 230                 235                 240

Arg Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu
                245                 250                 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu
            260                 265                 270

Arg Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp
        275                 280                 285

Met Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro
    290                 295                 300

Ser Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile
305                 310                 315                 320

Met Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp
                325                 330                 335

Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser
            340                 345                 350

Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala
        355                 360                 365
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Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn
370 375 380

Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val
385 390 395 400

Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro
405 410 415

Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile
420 425 430

Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met
435 440 445

Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr
450 455 460

Thr Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp
465 470 475 480

Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala
485 490 495

Asp Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr
500 505 510

Glu Gln Glu Met Ala Ser Leu Trp Thr Phe Asp Asp Ala Arg Ala Lys
515 520 525

Val Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly
530 535 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu
545 550 555 560

Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly
565 570 575

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```
Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
            580                 585                 590

Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Ile Leu Phe
        595                 600                 605

Gln Lys Asn Ile Glu Asn Ser Glu Val Ala Tyr Tyr Tyr Asn Pro Gly
    610                 615                 620

Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Arg Ile Pro Ser Ile Ile
625                 630                 635                 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp
                645                 650                 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser
            660                 665                 670

Thr Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Ser
        675                 680                 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser
    690                 695                 700

Ile Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys
705                 710                 715                 720

Asp Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
                725                 730                 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Asn Glu Gly Arg Arg
            740                 745                 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
        755                 760                 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
    770                 775                 780
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Asn Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785                 790                 795                 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Leu Ser Asp Ile Glu Leu Glu
                805                 810                 815

Glu Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
            820                 825                 830

Asp Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr
        835                 840                 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser
    850                 855                 860

Ile Ser Asp Ser Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Asp Asp
865                 870                 875                 880

Ser His Phe Ile Ser Phe Glu Asp Ile Ser Lys Thr Glu Asp Gly Phe
                885                 890                 895

Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
            900                 905                 910

Thr Glu Lys Glu Ile Phe Ser Glu Tyr Ala Asn His Ile Glu Arg Glu
        915                 920                 925

Ile Ser Asn Ile Lys Asp Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
    930                 935                 940

Val Lys Lys Val Asn Leu Asp Ala Ile His Glu Val Asn Thr Leu Asn
945                 950                 955                 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Gly Tyr Ser Ser Ser Lys Glu
                965                 970                 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
            980                 985                 990
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```
Leu Phe Ser Thr Gly Leu Asn Thr  Ile Thr Asp Ala Ala  Lys Val Val
        995                 1000                1005

Glu Leu  Val Ser Thr Ala Leu  Asp Glu Thr Ile Asp  Leu Leu Pro
    1010                1015                1020

Thr Leu  Ser Glu Gly Leu Pro  Val Ile Ala Thr Ile  Ile Asp Gly
    1025                1030                1035

Val Ser  Leu Gly Ala Ala Ile  Lys Glu Leu Ser Glu  Thr Ser Asp
    1040                1045                1050

Pro Leu  Leu Arg Gln Glu Ile  Glu Ala Lys Ile Gly  Ile Met Ala
    1055                1060                1065

Val Asn  Leu Thr Ala Ala Thr  Thr Ala Ile Ile Thr  Ser Ser Leu
    1070                1075                1080

Gly Ile  Ala Ser Gly Phe Ser  Ile Leu Leu Val Pro  Leu Ala Gly
    1085                1090                1095

Ile Ser  Ala Gly Ile Pro Ser  Leu Val Asn Asn Glu  Leu Val Leu
    1100                1105                1110

Arg Asp  Lys Ala Thr Lys Val  Val Asp Tyr Phe Lys  His Ile Ser
    1115                1120                1125

Leu Val  Glu Thr Glu Gly Ala  Phe Thr Leu Leu Asp  Asp Lys Ile
    1130                1135                1140

Met Ile  Pro Gln Asp Asp Leu  Val Ile Ser Glu Ile  Asp Phe Asn
    1145                1150                1155

Asn Asn  Ser Ile Val Leu Gly  Lys Cys Glu Ile Trp  Arg Met Glu
    1160                1165                1170

Gly Gly  Ser Gly His Thr Val  Thr Asn Asp Ile Asp  His Phe Phe
    1175                1180                1185
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```
Ser Ser  Pro Thr Ile Thr Tyr  Ile Lys Pro His Leu  Ser Ile Tyr
    1190                1195                1200

Asp Val  Leu Glu Val Gln Lys  Glu Glu Leu Asp Leu  Ser Lys Asp
    1205                1210                1215

Leu Met  Val Leu Pro Asn Ala  Pro Asn Arg Val Phe  Ala Trp Glu
    1220                1225                1230

Thr Gly  Trp Thr Pro Gly Leu  Arg Ser Leu Glu Asn  Glu Gly Thr
    1235                1240                1245

Lys Leu  Leu Asp Arg Ile Arg  Asp His Tyr Lys Gly  Glu Phe Tyr
    1250                1255                1260

Trp Arg  Tyr Phe Ala Phe Ile  Ala Asp Ala Leu Ile  Thr Thr Leu
    1265                1270                1275

Lys Pro  Arg Tyr Glu Asp Thr  Asn Ile Arg Ile Asn  Leu Asp Ser
    1280                1285                1290

Asn Asn  Arg Ser Phe Ile Val  Pro Ile Ile Thr Thr  Glu His Ile
    1295                1300                1305

Arg Glu  Lys Leu Ser Tyr Ser  Phe His Gly Ser Gly  Gly Thr Tyr
    1310                1315                1320

Ala Leu  Ser Leu Ser Gln Tyr  Asn Met Gly Ile Asn  Ile Glu Leu
    1325                1330                1335

Ser Glu  Ser Asp Val Trp Ile  Ile Asp Val Asp Asn  Val Val Arg
    1340                1345                1350

Asp Val  Thr Ile Asp Ser Asp  Lys Ile Lys Lys Gly  Asp Leu Ile
    1355                1360                1365

Glu Gly  Ile Leu Ser Thr Leu  Ser Ile Glu Asp Asn  Lys Ile Ile
    1370                1375                1380
```

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```
Leu Asn  His His Glu Ile Asn  Phe Ser Gly Asp Val  Asn Gly Ser
    1385                1390                1395

Asn Gly  Phe Ile Ser Leu Thr  Phe Ser Ile Leu Glu  Gly Ile Asn
    1400                1405                1410

Ala Ile  Ile Glu Val Asp Leu  Leu Ser Lys Ser Tyr  Lys Leu Leu
    1415                1420                1425

Ile Ser  Gly Glu Leu Lys Ile  Leu Met Leu Asn Ser  Asn His Ile
    1430                1435                1440

Gln Gln  Lys Ile Asp Tyr Ile  Gly Phe Asn Ser Glu  Leu Gln Lys
    1445                1450                1455

Asn Ile  Pro Tyr Ser Phe Val  Asp Ser Glu Gly Lys  Glu Asn Gly
    1460                1465                1470

Phe Ile  Asn Gly Ser Thr Lys  Glu Gly Leu Phe Val  Ser Glu Leu
    1475                1480                1485

Pro Asp  Val Val Leu Ile Ser  Lys Val Tyr Met Asp  Asp Ser Lys
    1490                1495                1500

Pro Ser  Phe Gly Tyr Tyr Ser  Asn Asn Leu Lys Asp  Val Lys Val
    1505                1510                1515

Ile Thr  Lys Asp Asn Val Asn  Ile Leu Thr Gly Tyr  Tyr Leu Lys
    1520                1525                1530

Asp Asp  Ile Lys Ile Ser Leu  Ser Phe Thr Leu Gln  Asp Glu Lys
    1535                1540                1545

Thr Ile  Lys Leu Asn Gly Val  His Leu Asp Glu Ser  Gly Val Ala
    1550                1555                1560

Glu Ile  Leu Lys Phe Met Asn  Lys Lys Gly Ser Thr  Asn Thr Ser
    1565                1570                1575
```

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Asp Ser Leu Met Ser Phe Leu Glu Ser Val Asn Ile Lys Ser Ile
1580 1585 1590

Phe Val Asn Phe Leu Gln Ser Lys Ile Asn Phe Ile Leu Asp Ala
1595 1600 1605

Asn Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe
1610 1615 1620

Ile Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe
1625 1630 1635

Asn Thr Leu Glu Thr Thr Tyr Thr Leu Tyr Val Gly Asn Arg Gln
1640 1645 1650

Asn Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp
1655 1660 1665

Ile Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly
1670 1675 1680

Ile Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr
1685 1690 1695

Thr Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Asn
1700 1705 1710

Tyr Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys
1715 1720 1725

Ile Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser
1730 1735 1740

Asn Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn
1745 1750 1755

Lys Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp
1760 1765 1770

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Lys Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln
1775 1780 1785

Asp Val Pro Val Ser Glu Ile Ile Ser Ala Phe Thr Pro Ser Tyr
1790 1795 1800

Tyr Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu
1805 1810 1815

Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser
1820 1825 1830

Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro
1835 1840 1845

Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys
1850 1855 1860

Tyr Tyr Phe Asn Pro Thr Asn Gly Gly Ala Ala Ser Ile Gly Glu
1865 1870 1875

Thr Ile Ile Asn Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Ile
1880 1885 1890

Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Leu Lys Tyr Phe
1895 1900 1905

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile
1910 1915 1920

Asp Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe
1925 1930 1935

Glu Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly
1940 1945 1950

Glu Met Tyr Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly
1955 1960 1965

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Leu Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly
1970 1975 1980

Ile Met Gln Lys Gly Phe Val Ser Ile Asn Asp Lys Lys Tyr Tyr
1985 1990 1995

Phe Asp Asp Ser Gly Val Met Lys Val Gly Tyr Ile Glu Ile Asp
2000 2005 2010

Gly Lys Tyr Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly
2015 2020 2025

Val Phe Asn Thr Ser Asp Gly Phe Lys Tyr Phe Ala His His Asn
2030 2035 2040

Glu Asp Leu Gly Asn Glu Glu Gly Glu Ala Ile Ser Tyr Ser Gly
2045 2050 2055

Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Tyr Ser Phe
2060 2065 2070

Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr
2075 2080 2085

Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Val Gly Leu Ser Leu
2090 2095 2100

Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln
2105 2110 2115

Val Gly Phe Val Thr Ile Asn Asn Lys Val Phe Tyr Phe Ser Asp
2120 2125 2130

Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
2135 2140 2145

Phe Tyr Ile Asp Glu Lys Gly Ile Val Gln Ile Gly Val Phe Asp
2150 2155 2160

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Thr Ser Asp Glu Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn
2165 2170 2175

Asp Asn Ile Tyr Gly Gln Ala Val Asp Tyr Ser Gly Leu Val Arg
2180 2185 2190

Val Gly Glu Asp Ile Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu
2195 2200 2205

Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile
2225 2230 2235

Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Asn Gly Ile Met Arg Thr
2240 2245 2250

Gly Leu Ile Ser Phe Glu Asn Asn Asp Tyr Tyr Phe Asn Glu Asn
2255 2260 2265

Gly Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe
2270 2275 2280

Tyr Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr
2285 2290 2295

Gln Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu
2300 2305 2310

Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu
2315 2320 2325

Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr
2330 2335 2340

Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp
2345 2350 2355

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Thr Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 126
<211> 2367
<212> PRT
<213> Clostridium difficile

<400> 126

Met Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg
1 5 10 15

Phe Arg Val Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
20 25 30

Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
35 40 45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Thr Tyr Ile Asp Thr Tyr Lys
50 55 60

Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65 70 75 80

Thr Glu Ile Leu Glu Leu Lys Asn Ser Asn Leu Thr Pro Val Glu Lys
85 90 95

Asn Leu His Phe Ile Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
100 105 110

Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
115 120 125

Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
130 135 140

Ile Ile Glu Ser Ala Ser Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145 150 155 160

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```
Leu Asn Asp Pro Glu Phe Asn His Thr Ala Phe Phe Arg Lys Arg Met
                165                 170                 175

Gln Ile Ile Tyr Asp Lys Gln Gln Asn Phe Ile Asn Tyr Tyr Lys Ala
            180                 185                 190

Gln Lys Glu Glu Asn Pro Asp Leu Ile Ile Asp Asp Ile Val Lys Thr
        195                 200                 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Asp Ile Asp Glu Leu Asn Ala Tyr
    210                 215                 220

Ile Glu Glu Ser Leu Asn Lys Val Thr Glu Asn Ser Gly Asn Asp Val
225                 230                 235                 240

Arg Asn Phe Glu Glu Phe Lys Thr Gly Glu Val Phe Asn Leu Tyr Glu
                245                 250                 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Gly Ala Ser Asp Ile Leu
            260                 265                 270

Arg Val Ala Ile Leu Lys Asn Ile Gly Gly Val Tyr Leu Asp Val Asp
        275                 280                 285

Met Leu Pro Gly Ile His Pro Asp Leu Phe Lys Asp Ile Asn Lys Pro
    290                 295                 300

Asp Ser Val Lys Thr Ala Val Asp Trp Glu Glu Met Gln Leu Glu Ala
305                 310                 315                 320

Ile Met Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Lys His Phe
                325                 330                 335

Asp Thr Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala
            340                 345                 350

Ser Lys Ser Asp Lys Ser Glu Ile Phe Leu Pro Leu Gly Asp Ile Glu
        355                 360                 365
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```
Val Ser Pro Leu Glu Val Lys Ile Ala Phe Ala Lys Gly Ser Ile Ile
    370                 375                 380

Asn Gln Ala Leu Ile Ser Ala Lys Asp Ser Tyr Cys Ser Asp Leu Leu
385                 390                 395                 400

Ile Lys Gln Ile Gln Asn Arg Tyr Lys Ile Leu Asn Asp Thr Leu Gly
                405                 410                 415

Pro Ile Ile Ser Gln Gly Asn Asp Phe Asn Thr Thr Met Asn Asn Phe
            420                 425                 430

Gly Glu Ser Leu Gly Ala Ile Ala Asn Glu Glu Asn Ile Ser Phe Ile
        435                 440                 445

Ala Lys Ile Gly Ser Tyr Leu Arg Val Gly Phe Tyr Pro Glu Ala Asn
    450                 455                 460

Thr Thr Ile Thr Leu Ser Gly Pro Thr Ile Tyr Ala Gly Ala Tyr Lys
465                 470                 475                 480

Asp Leu Leu Thr Phe Lys Glu Met Ser Ile Asp Thr Ser Ile Leu Ser
                485                 490                 495

Ser Glu Leu Arg Asn Phe Glu Phe Pro Lys Val Asn Ile Ser Gln Ala
            500                 505                 510

Thr Glu Gln Glu Lys Asn Ser Leu Trp Gln Phe Asn Glu Glu Arg Ala
        515                 520                 525

Lys Ile Gln Phe Glu Glu Tyr Lys Lys Asn Tyr Phe Glu Gly Ala Leu
    530                 535                 540

Gly Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Thr Val Ile Asp Lys
545                 550                 555                 560

Glu Tyr Leu Leu Glu Lys Ile Ser Ser Ser Thr Lys Ser Ser Glu Arg
                565                 570                 575
```

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```
Gly Tyr Val His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr
            580                 585                 590

Glu Ala Ala Cys Asn Leu Phe Ala Lys Asn Pro Tyr Asp Ser Ile Leu
        595                 600                 605

Phe Gln Lys Asn Ile Glu Asp Ser Glu Val Ala Tyr Tyr Tyr Asn Pro
    610                 615                 620

Thr Asp Ser Glu Ile Gln Glu Ile Asp Lys Tyr Arg Ile Pro Asp Arg
625                 630                 635                 640

Ile Ser Asp Arg Pro Lys Ile Lys Leu Thr Leu Ile Gly His Gly Lys
                645                 650                 655

Ala Glu Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu
            660                 665                 670

Ser Ser Glu Ile Glu Thr Ile Ile Asp Leu Ala Lys Ala Asp Ile Ser
        675                 680                 685

Pro Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr
    690                 695                 700

Ser Val Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Arg Val
705                 710                 715                 720

Lys Asp Lys Val Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile
                725                 730                 735

Ile Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
            740                 745                 750

Arg Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser
        755                 760                 765

Ile Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys
    770                 775                 780
```

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```
Glu Asn Lys Ile Ile Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr
785                 790                 795                 800

Leu Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu
                805                 810                 815

Glu Glu Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn
            820                 825                 830

Ile Glu Thr Gln Val Val Glu Glu Arg Ile Glu Glu Ala Lys Ser Leu
        835                 840                 845

Thr Ser Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu
    850                 855                 860

Ser Ile Ser Asp Ala Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Glu
865                 870                 875                 880

Glu Ser His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly
                885                 890                 895

Phe Ser Ile Arg Phe Ile Asp Lys Glu Thr Gly Glu Ser Ile Phe Val
            900                 905                 910

Glu Thr Glu Lys Ala Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu
        915                 920                 925

Glu Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys
    930                 935                 940

Leu Val Lys Lys Val Asn Leu Asp Ala Thr His Glu Val Asn Thr Leu
945                 950                 955                 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys
                965                 970                 975

Glu Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala
            980                 985                 990
```

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```
Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Thr Asp Ala  Ala Lys Val
        995                 1000                1005

Val Glu  Leu Val Ser Thr Ala  Leu Asp Glu Thr Ile  Asp Leu Leu
    1010                1015                1020

Pro Thr  Leu Ser Glu Gly Leu  Pro Val Ile Ala Thr  Ile Ile Asp
    1025                1030                1035

Gly Val  Ser Leu Gly Ala Ala  Ile Lys Glu Leu Ser  Glu Thr Ser
    1040                1045                1050

Asp Pro  Leu Leu Arg Gln Glu  Ile Glu Ala Lys Ile  Gly Ile Met
    1055                1060                1065

Ala Val  Asn Leu Thr Ala Ala  Thr Thr Ala Ile Ile  Thr Ser Ser
    1070                1075                1080

Leu Gly  Ile Ala Ser Gly Phe  Ser Ile Leu Leu Val  Pro Leu Ala
    1085                1090                1095

Gly Ile  Ser Ala Gly Ile Pro  Ser Leu Val Asn Asn  Glu Leu Ile
    1100                1105                1110

Leu Arg  Asp Lys Ala Thr Lys  Val Val Asp Tyr Phe  Ser His Ile
    1115                1120                1125

Ser Leu  Ala Glu Ser Glu Gly  Ala Phe Thr Ser Leu  Asp Asp Lys
    1130                1135                1140

Ile Met  Met Pro Gln Asp Asp  Leu Val Ile Ser Glu  Ile Asp Phe
    1145                1150                1155

Asn Asn  Asn Ser Ile Thr Leu  Gly Lys Cys Glu Ile  Trp Arg Met
    1160                1165                1170

Glu Gly  Gly Ser Gly His Thr  Val Thr Asp Asp Ile  Asp His Phe
    1175                1180                1185
```

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```
Phe Ser  Ser Pro Ser Ile Thr  Tyr Arg Glu Pro His  Leu Ser Ile
    1190                1195                1200

Tyr Asp  Val Leu Glu Val Lys  Lys Glu Glu Leu Asp  Leu Ser Lys
    1205                1210                1215

Asp Leu  Met Val Leu Pro Asn  Ala Pro Asn Arg Val  Phe Gly Trp
    1220                1225                1230

Glu Thr  Gly Trp Thr Pro Gly  Leu Arg Gly Leu Glu  Asn Asp Gly
    1235                1240                1245

Thr Lys  Leu Leu Asp Arg Ile  Arg Asp Gln Tyr Glu  Gly Gln Phe
    1250                1255                1260

Tyr Trp  Arg Phe Phe Ala Phe  Ile Ala Asp Ala Leu  Ile Thr Thr
    1265                1270                1275

Leu Lys  Pro Arg Tyr Glu Asp  Thr Asn Val Arg Ile  Ser Leu Asp
    1280                1285                1290

Ser Asn  Thr Arg Ser Phe Ile  Val Pro Val Ile Thr  Thr Glu Tyr
    1295                1300                1305

Ile Arg  Glu Lys Leu Ser Tyr  Ser Phe Tyr Gly Ser  Gly Gly Thr
    1310                1315                1320

Tyr Ala  Leu Ser Leu Ser Gln  Tyr Asn Met Asn Ile  Asn Ile Glu
    1325                1330                1335

Leu Asn  Glu Asn Asp Thr Trp  Val Ile Asp Val Asp  Asn Val Val
    1340                1345                1350

Arg Ser  Val Thr Ile Glu Ser  Asp Lys Ile Lys Lys  Gly Asp Leu
    1355                1360                1365

Ile Glu  Asn Ile Leu Ser Lys  Leu Ser Ile Glu Asp  Asn Lys Ile
    1370                1375                1380
```

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```
Ile Leu  Asp Asn His Glu Ile  Asn Phe Ser Gly Thr  Leu Asn Gly
    1385                1390                1395

Gly Asn  Gly Phe Val Ser Leu  Thr Phe Ser Ile Leu  Glu Gly Ile
    1400                1405                1410

Asn Ala  Val Ile Glu Val Asp  Leu Leu Ser Lys Ser  Tyr Lys Val
    1415                1420                1425

Leu Ile  Ser Gly Glu Leu Lys  Thr Leu Met Ala Asn  Ser Asn Ser
    1430                1435                1440

Val Gln  Gln Lys Ile Asp Tyr  Ile Gly Leu Asn Ser  Glu Leu Gln
    1445                1450                1455

Lys Asn  Ile Pro Tyr Ser Phe  Met Asp Asp Lys Gly  Lys Glu Asn
    1460                1465                1470

Gly Phe  Ile Asn Cys Ser Thr  Lys Glu Gly Leu Phe  Val Ser Glu
    1475                1480                1485

Leu Ser  Asp Val Val Leu Ile  Ile Lys Val Tyr Met  Asp Asn Ser
    1490                1495                1500

Lys Pro  Pro Phe Gly Tyr Tyr  Ser Asn Asp Leu Lys  Asp Val Lys
    1505                1510                1515

Ala Ile  Thr Lys Asp Asp Val  Ile Ile Leu Thr Gly  Tyr Tyr Leu
    1520                1525                1530

Lys Asp  Asp Ile Lys Ile Ser  Leu Ser Phe Thr Ile  Gln Asp Lys
    1535                1540                1545

Asn Thr  Ile Lys Leu Asn Gly  Val Tyr Leu Asp Glu  Asn Gly Val
    1550                1555                1560

Ala Glu  Ile Leu Lys Phe Met  Asn Lys Lys Gly Ser  Thr Asn Thr
    1565                1570                1575
```

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```
Ser Asp  Ser Leu Met Ser Phe  Leu Glu Ser Met Asn  Ile Lys Ser
    1580                 1585                 1590

Ile Phe  Ile Lys Ser Leu Lys  Ser Asn Ala Lys Leu  Ile Leu Asp
    1595                 1600                 1605

Thr Asn  Phe Ile Ile Ser Gly  Thr Thr Ser Ile Gly  Gln Phe Glu
    1610                 1615                 1620

Phe Ile  Cys Asp Lys Asp Asn  Asn Ile Gln Pro Tyr  Phe Ile Lys
    1625                 1630                 1635

Phe Asn  Thr Leu Glu Thr Lys  Tyr Thr Leu Tyr Val  Gly Asn Arg
    1640                 1645                 1650

Gln Asn  Met Ile Val Glu Pro  Asn Tyr Asp Leu Asp  Asp Ser Gly
    1655                 1660                 1665

Asp Ile  Ser Ser Thr Val Ile  Asn Phe Ser Gln Lys  Tyr Leu Tyr
    1670                 1675                 1680

Gly Ile  Asp Ser Cys Val Asn  Lys Val Ile Ile Ser  Pro Asn Ile
    1685                 1690                 1695

Tyr Thr  Asp Glu Ile Asn Ile  Thr Pro Ile Tyr Glu  Ala Asn Asn
    1700                 1705                 1710

Thr Tyr  Pro Glu Val Ile Val  Leu Asp Thr Asn Tyr  Ile Ser Glu
    1715                 1720                 1725

Lys Ile  Asn Ile Asn Ile Asn  Asp Leu Ser Ile Arg  Tyr Val Trp
    1730                 1735                 1740

Ser Asn  Asp Gly Ser Asp Phe  Ile Leu Met Ser Thr  Asp Glu Glu
    1745                 1750                 1755

Asn Lys  Val Ser Gln Val Lys  Ile Arg Phe Thr Asn  Val Phe Lys
    1760                 1765                 1770
```

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```
Gly Asn  Thr Ile Ser Asp Lys  Ile Ser Phe Asn Phe  Ser Asp Lys
    1775                1780                1785

Gln Asp  Val Ser Ile Asn Lys  Ile Ile Ser Thr Phe  Thr Pro Ser
    1790                1795                1800

Tyr Tyr  Val Glu Gly Leu Leu  Asn Tyr His Leu Gly  Leu Ile Ser
    1805                1810                1815

Leu Tyr  Asn Glu Lys Phe Tyr  Ile Asn Asn Phe Gly  Met Met Val
    1820                1825                1830

Ser Gly  Leu Val Tyr Ile Asn  Asp Ser Leu Tyr Tyr  Phe Lys Pro
    1835                1840                1845

Pro Ile  Lys Asn Leu Ile Thr  Gly Phe Thr Thr Ile  Gly Asp Asp
    1850                1855                1860

Lys Tyr  Tyr Phe Asn Pro Asp  Asn Gly Gly Ala Ala  Ser Val Gly
    1865                1870                1875

Glu Thr  Ile Ile Asp Gly Lys  Asn Tyr Tyr Phe Ser  Pro Asn Gly
    1880                1885                1890

Val Leu  Gln Thr Gly Val Phe  Ser Thr Glu Asp Gly  Phe Lys Tyr
    1895                1900                1905

Phe Ala  Pro Ala Asp Thr Leu  Asp Glu Asn Leu Glu  Gly Glu Ala
    1910                1915                1920

Ile Asp  Phe Thr Gly Lys Leu  Ile Ile Asp Glu Asn  Val Tyr Tyr
    1925                1930                1935

Phe Gly  Asp Asn Tyr Arg Ala  Ala Ile Glu Trp Gln  Thr Leu Asp
    1940                1945                1950

Asp Glu  Val Tyr Tyr Phe Ser  Thr Asp Thr Gly Arg  Ala Phe Lys
    1955                1960                1965
```

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```
Gly Leu  Asn Gln Ile Gly Asp  Asp Lys Phe Tyr Phe  Asn Ser Asp
    1970                1975                1980

Gly Ile  Met Gln Lys Gly Phe  Val Asn Ile Asn Asp  Lys Thr Phe
    1985                1990                1995

Tyr Phe  Asp Asp Ser Gly Val  Met Lys Ser Gly Tyr  Thr Glu Ile
    2000                2005                2010

Asp Gly  Lys His Phe Tyr Phe  Ala Glu Asn Gly Glu  Met Gln Ile
    2015                2020                2025

Gly Val  Phe Asn Thr Ala Asp  Gly Phe Lys Tyr Phe  Ala His His
    2030                2035                2040

Asp Glu  Asp Leu Gly Asn Glu  Glu Gly Glu Ala Leu  Ser Tyr Ser
    2045                2050                2055

Gly Ile  Leu Asn Phe Asn Asn  Lys Ile Tyr Tyr Phe  Asp Asp Ser
    2060                2065                2070

Phe Thr  Ala Val Val Gly Trp  Lys Asp Ser Glu Asp  Gly Ser Lys
    2075                2080                2085

Tyr Tyr  Phe Asp Glu Asp Thr  Ala Glu Ala Tyr Ile  Gly Ile Ser
    2090                2095                2100

Thr Ile  Asn Asp Gly Lys Tyr  Tyr Phe Asn Asp Ser  Gly Ile Met
    2105                2110                2115

Gln Ile  Gly Phe Val Thr Ile  Asn Asn Glu Val Phe  Tyr Phe Ser
    2120                2125                2130

Asp Ser  Gly Ile Val Glu Ser  Gly Met Gln Asn Ile  Asp Asp Asn
    2135                2140                2145

Tyr Phe  Tyr Ile Asp Glu Asn  Gly Leu Val Gln Ile  Gly Val Phe
    2150                2155                2160
```

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Asp Thr Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val
2165 2170 2175

Asn Asp Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val
2180 2185 2190

Arg Val Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile
2195 2200 2205

Glu Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr
2210 2215 2220

Tyr Phe Asp Pro Glu Thr Lys Lys Ala Tyr Lys Gly Ile Asn Val
2225 2230 2235

Ile Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Asn Gly Ile Met Arg
2240 2245 2250

Thr Gly Leu Ile Thr Phe Glu Asp Asn His Tyr Tyr Phe Asn Glu
2255 2260 2265

Asp Gly Ile Met Gln Tyr Gly Tyr Ile Asn Ile Glu Asp Lys Met
2270 2275 2280

Phe Tyr Phe Asn Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn
2285 2290 2295

Thr Ala Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp
2300 2305 2310

Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp
2315 2320 2325

Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala
2330 2335 2340

Ile Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro
2345 2350 2355

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Asp Thr Ala Glu Leu Val Ile Ser Glu
2360 2365

<210> 127
<211> 2367
<212> PRT
<213> Clostridium difficile

<400> 127

Met Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg
1 5 10 15

Phe Arg Val Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
20 25 30

Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
35 40 45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Thr Tyr Ile Asp Thr Tyr Lys
50 55 60

Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65 70 75 80

Thr Glu Ile Leu Glu Leu Lys Asn Ser Asn Leu Thr Pro Val Glu Lys
85 90 95

Asn Leu His Phe Ile Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
100 105 110

Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
115 120 125

Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
130 135 140

Ile Ile Glu Ser Ala Ser Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145 150 155 160

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```
Leu Asn Asp Pro Glu Phe Asn His Thr Ala Phe Phe Arg Lys Arg Met
                165                 170                 175

Gln Ile Ile Tyr Asp Lys Gln Gln Asn Phe Ile Asn Tyr Tyr Lys Ala
            180                 185                 190

Gln Lys Glu Glu Asn Pro Asp Leu Ile Ile Asp Asp Ile Val Lys Thr
        195                 200                 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Asp Ile Asp Glu Leu Asn Ala Tyr
    210                 215                 220

Ile Glu Glu Ser Leu Asn Lys Val Thr Glu Asn Ser Gly Asn Asp Val
225                 230                 235                 240

Arg Asn Phe Glu Glu Phe Lys Thr Gly Glu Val Phe Asn Leu Tyr Glu
                245                 250                 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Gly Ala Ser Asp Ile Leu
            260                 265                 270

Arg Val Ala Ile Leu Lys Asn Ile Gly Gly Val Tyr Leu Asp Val Asp
        275                 280                 285

Met Leu Pro Gly Ile His Pro Asp Leu Phe Lys Asp Ile Asn Lys Pro
    290                 295                 300

Asp Ser Val Lys Thr Ala Val Asp Trp Glu Glu Met Gln Leu Glu Ala
305                 310                 315                 320

Ile Met Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Lys His Phe
                325                 330                 335

Asp Thr Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala
            340                 345                 350

Ser Lys Ser Asp Lys Ser Glu Ile Phe Leu Pro Leu Gly Asp Ile Glu
        355                 360                 365
```

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```
Val Ser Pro Leu Glu Val Lys Ile Ala Phe Ala Lys Gly Ser Ile Ile
    370                 375                 380

Asn Gln Ala Leu Ile Ser Ala Lys Asp Ser Tyr Cys Ser Asp Leu Leu
385                 390                 395                 400

Ile Lys Gln Ile Gln Asn Arg Tyr Lys Ile Leu Asn Asp Thr Leu Gly
                405                 410                 415

Pro Ile Ile Ser Gln Gly Asn Asp Phe Asn Thr Thr Met Asn Asn Phe
            420                 425                 430

Gly Glu Ser Leu Gly Ala Ile Ala Asn Glu Glu Asn Ile Ser Phe Ile
        435                 440                 445

Ala Lys Ile Gly Ser Tyr Leu Arg Val Gly Phe Tyr Pro Glu Ala Asn
    450                 455                 460

Thr Thr Ile Thr Leu Ser Gly Pro Thr Ile Tyr Ala Gly Ala Tyr Lys
465                 470                 475                 480

Asp Leu Leu Thr Phe Lys Glu Met Ser Ile Asp Thr Ser Ile Leu Ser
                485                 490                 495

Ser Glu Leu Arg Asn Phe Glu Phe Pro Lys Val Asn Ile Ser Gln Ala
            500                 505                 510

Thr Glu Gln Glu Lys Asn Ser Leu Trp Gln Phe Asn Glu Glu Arg Ala
        515                 520                 525

Lys Ile Gln Phe Glu Glu Tyr Lys Lys Asn Tyr Phe Glu Gly Ala Leu
    530                 535                 540

Gly Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Thr Val Ile Asp Lys
545                 550                 555                 560

Glu Tyr Leu Leu Glu Lys Ile Ser Ser Ser Thr Lys Ser Ser Glu Arg
                565                 570                 575
```

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```
Gly Tyr Val His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr
            580                 585                 590

Glu Ala Ala Cys Asn Leu Phe Ala Lys Asn Pro Tyr Asp Ser Ile Leu
        595                 600                 605

Phe Gln Lys Asn Ile Glu Asp Ser Glu Val Ala Tyr Tyr Tyr Asn Pro
    610                 615                 620

Thr Asp Ser Glu Ile Gln Glu Ile Asp Lys Tyr Arg Ile Pro Asp Arg
625                 630                 635                 640

Ile Ser Asp Arg Pro Lys Ile Lys Leu Thr Leu Ile Gly His Gly Lys
                645                 650                 655

Ala Glu Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu
            660                 665                 670

Ser Ser Glu Ile Glu Thr Ile Ile Asp Leu Ala Lys Ala Asp Ile Ser
        675                 680                 685

Pro Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr
    690                 695                 700

Ser Val Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Arg Val
705                 710                 715                 720

Lys Asp Lys Val Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile
                725                 730                 735

Ile Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
            740                 745                 750

Arg Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser
        755                 760                 765

Ile Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys
    770                 775                 780
```

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```
Glu Asn Lys Ile Ile Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr
785                 790                 795                 800

Leu Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu
                805                 810                 815

Glu Glu Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn
            820                 825                 830

Ile Glu Thr Gln Val Val Glu Glu Arg Ile Glu Glu Ala Lys Ser Leu
        835                 840                 845

Thr Ser Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu
    850                 855                 860

Ser Ile Ser Asp Ala Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Glu
865                 870                 875                 880

Glu Ser His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly
                885                 890                 895

Phe Ser Ile Arg Phe Ile Asp Lys Glu Thr Gly Glu Ser Ile Phe Val
            900                 905                 910

Glu Thr Glu Lys Ala Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu
        915                 920                 925

Glu Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys
    930                 935                 940

Leu Val Lys Lys Val Asn Leu Asp Ala Thr His Glu Val Asn Thr Leu
945                 950                 955                 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys
                965                 970                 975

Glu Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala
            980                 985                 990
```

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```
Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Thr Asp Ala  Ala Lys Val
        995                 1000                1005

Val Glu  Leu Val Ser Thr Ala  Leu Asp Glu Thr Ile  Asp Leu Leu
    1010                1015                1020

Pro Thr  Leu Ser Glu Gly Leu  Pro Val Ile Ala Thr  Ile Ile Asp
    1025                1030                1035

Gly Val  Ser Leu Gly Ala Ala  Ile Lys Glu Leu Ser  Glu Thr Ser
    1040                1045                1050

Asp Pro  Leu Leu Arg Gln Glu  Ile Glu Ala Lys Ile  Gly Ile Met
    1055                1060                1065

Ala Val  Asn Leu Thr Ala Ala  Thr Thr Ala Ile Ile  Thr Ser Ser
    1070                1075                1080

Leu Gly  Ile Ala Ser Gly Phe  Ser Ile Leu Leu Val  Pro Leu Ala
    1085                1090                1095

Gly Ile  Ser Ala Gly Ile Pro  Ser Leu Val Asn Asn  Glu Leu Ile
    1100                1105                1110

Leu Arg  Asp Lys Ala Thr Lys  Val Val Asp Tyr Phe  Ser His Ile
    1115                1120                1125

Ser Leu  Ala Glu Ser Glu Gly  Ala Phe Thr Ser Leu  Asp Asp Lys
    1130                1135                1140

Ile Met  Met Pro Gln Asp Asp  Leu Val Ile Ser Glu  Ile Asp Phe
    1145                1150                1155

Asn Asn  Asn Ser Ile Thr Leu  Gly Lys Cys Glu Ile  Trp Arg Met
    1160                1165                1170

Glu Gly  Gly Ser Gly His Thr  Val Thr Asp Asp Ile  Asp His Phe
    1175                1180                1185
```

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```
Phe Ser  Ser Pro Ser Ile Thr  Tyr Arg Glu Pro His  Leu Ser Ile
    1190                1195                1200

Tyr Asp  Val Leu Glu Val Lys  Lys Glu Glu Leu Asp  Leu Ser Lys
    1205                1210                1215

Asp Leu  Met Val Leu Pro Asn  Ala Pro Asn Arg Val  Phe Gly Trp
    1220                1225                1230

Glu Thr  Gly Trp Thr Pro Gly  Leu Arg Gly Leu Glu  Asn Asp Gly
    1235                1240                1245

Thr Lys  Leu Leu Asp Arg Ile  Arg Asp Gln Tyr Glu  Gly Gln Phe
    1250                1255                1260

Tyr Trp  Arg Phe Phe Ala Phe  Ile Ala Asp Ala Leu  Ile Thr Thr
    1265                1270                1275

Leu Lys  Pro Arg Tyr Glu Asp  Thr Asn Val Arg Ile  Ser Leu Asp
    1280                1285                1290

Ser Asn  Thr Arg Ser Phe Ile  Val Pro Val Ile Thr  Thr Glu Tyr
    1295                1300                1305

Ile Arg  Glu Lys Leu Ser Tyr  Ser Phe Tyr Gly Ser  Gly Gly Thr
    1310                1315                1320

Tyr Ala  Leu Ser Leu Ser Gln  Tyr Asn Met Asn Ile  Asn Ile Glu
    1325                1330                1335

Leu Asn  Glu Asn Asp Thr Trp  Val Ile Asp Val Asp  Asn Val Val
    1340                1345                1350

Arg Ser  Val Thr Ile Glu Ser  Asp Lys Ile Lys Lys  Gly Asp Leu
    1355                1360                1365

Ile Glu  Asn Ile Leu Ser Lys  Leu Ser Ile Glu Asp  Asn Lys Ile
    1370                1375                1380
```

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Ile Leu Asp Asn His Glu Ile Asn Phe Ser Gly Thr Leu Asn Gly
1385 1390 1395

Gly Asn Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile
1400 1405 1410

Asn Ala Val Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Val
1415 1420 1425

Leu Ile Ser Gly Glu Leu Lys Thr Leu Met Ala Asn Ser Asn Ser
1430 1435 1440

Val Gln Gln Lys Ile Asp Tyr Ile Gly Leu Asn Ser Glu Leu Gln
1445 1450 1455

Lys Asn Ile Pro Tyr Ser Phe Met Asp Asp Lys Gly Lys Glu Asn
1460 1465 1470

Gly Phe Ile Asn Cys Ser Thr Lys Glu Gly Leu Phe Val Ser Glu
1475 1480 1485

Leu Ser Asp Val Val Leu Ile Ile Lys Val Tyr Met Asp Asn Ser
1490 1495 1500

Lys Pro Pro Phe Gly Tyr Tyr Ser Asn Asp Leu Lys Asp Val Lys
1505 1510 1515

Ala Ile Thr Lys Asp Asp Val Ile Ile Leu Thr Gly Tyr Tyr Leu
1520 1525 1530

Lys Asp Asp Ile Lys Ile Ser Leu Ser Phe Thr Ile Gln Asp Lys
1535 1540 1545

Asn Thr Ile Lys Leu Asn Gly Val Tyr Leu Asp Glu Asn Gly Val
1550 1555 1560

Ala Glu Ile Leu Lys Phe Met Asn Lys Lys Gly Ser Thr Asn Thr
1565 1570 1575

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```
Ser Asp  Ser Leu Met Ser Phe  Leu Glu Ser Met Asn  Ile Lys Ser
    1580                1585                1590

Ile Phe  Ile Lys Ser Leu Lys  Ser Asn Ala Lys Leu  Ile Leu Asp
    1595                1600                1605

Thr Asn  Phe Ile Ile Ser Gly  Thr Thr Ser Ile Gly  Gln Phe Glu
    1610                1615                1620

Phe Ile  Cys Asp Lys Asp Asn  Asn Ile Gln Pro Tyr  Phe Ile Lys
    1625                1630                1635

Phe Asn  Thr Leu Glu Thr Lys  Tyr Thr Leu Tyr Val  Gly Asn Arg
    1640                1645                1650

Gln Asn  Met Ile Val Glu Pro  Asn Tyr Asp Leu Asp  Asp Ser Gly
    1655                1660                1665

Asp Ile  Ser Ser Thr Val Ile  Asn Phe Ser Gln Lys  Tyr Leu Tyr
    1670                1675                1680

Gly Ile  Asp Ser Cys Val Asn  Lys Val Ile Ile Ser  Pro Asn Ile
    1685                1690                1695

Tyr Thr  Asp Glu Ile Asn Ile  Thr Pro Ile Tyr Glu  Ala Asn Asn
    1700                1705                1710

Thr Tyr  Pro Glu Val Ile Val  Leu Asp Thr Asn Tyr  Ile Ser Glu
    1715                1720                1725

Lys Ile  Asn Ile Asn Ile Asn  Asp Leu Ser Ile Arg  Tyr Val Trp
    1730                1735                1740

Ser Asn  Asp Gly Ser Asp Phe  Ile Leu Met Ser Thr  Asp Glu Glu
    1745                1750                1755

Asn Lys  Val Ser Gln Val Lys  Ile Arg Phe Thr Asn  Val Phe Lys
    1760                1765                1770
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Gly Asn  Thr Ile Ser Asp Lys  Ile Ser Phe Asn Phe  Ser Asp Lys
    1775                1780                1785

Gln Asp  Val Ser Ile Asn Lys  Ile Ile Ser Thr Phe  Thr Pro Ser
    1790                1795                1800

Tyr Tyr  Val Glu Gly Leu Leu  Asn Tyr His Leu Gly  Leu Ile Ser
    1805                1810                1815

Leu Tyr  Asn Glu Lys Phe Tyr  Ile Asn Asn Phe Gly  Met Met Val
    1820                1825                1830

Ser Gly  Leu Val Tyr Ile Asn  Asp Ser Leu Tyr Tyr  Phe Lys Pro
    1835                1840                1845

Pro Ile  Lys Asn Leu Ile Thr  Gly Phe Thr Thr Ile  Gly Asp Asp
    1850                1855                1860

Lys Tyr  Tyr Phe Asn Pro Asp  Asn Gly Gly Ala Ala  Ser Val Gly
    1865                1870                1875

Glu Thr  Ile Ile Asp Gly Lys  Asn Tyr Tyr Phe Ser  Pro Asn Gly
    1880                1885                1890

Val Leu  Gln Thr Gly Val Phe  Ser Thr Glu Asp Gly  Phe Lys Tyr
    1895                1900                1905

Phe Ala  Pro Ala Asp Thr Leu  Asp Glu Asn Leu Glu  Gly Glu Ala
    1910                1915                1920

Ile Asp  Phe Thr Gly Lys Leu  Ile Ile Asp Glu Asn  Val Tyr Tyr
    1925                1930                1935

Phe Gly  Asp Asn Tyr Arg Ala  Ala Ile Glu Trp Gln  Thr Leu Asp
    1940                1945                1950

Asp Glu  Val Tyr Tyr Phe Ser  Thr Asp Thr Gly Arg  Ala Phe Lys
    1955                1960                1965
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Gly Leu  Asn Gln Ile Gly Asp  Asp Lys Phe Tyr Phe  Asn Ser Asp
    1970                1975                1980

Gly Ile  Met Gln Lys Gly Phe  Val Asn Ile Asn Asp  Lys Thr Phe
    1985                1990                1995

Tyr Phe  Asp Asp Ser Gly Val  Met Lys Ser Gly Tyr  Thr Glu Ile
    2000                2005                2010

Asp Gly  Lys His Phe Tyr Phe  Ala Glu Asn Gly Glu  Met Gln Ile
    2015                2020                2025

Gly Val  Phe Asn Thr Ala Asp  Gly Phe Lys Tyr Phe  Ala His His
    2030                2035                2040

Asp Glu  Asp Leu Gly Asn Glu  Glu Gly Glu Ala Leu  Ser Tyr Ser
    2045                2050                2055

Gly Ile  Leu Asn Phe Asn Asn  Lys Ile Tyr Tyr Phe  Asp Asp Ser
    2060                2065                2070

Phe Thr  Ala Val Val Gly Trp  Lys Asp Ser Glu Asp  Gly Ser Lys
    2075                2080                2085

Tyr Tyr  Phe Asp Glu Asp Thr  Ala Glu Ala Tyr Ile  Gly Ile Ser
    2090                2095                2100

Thr Ile  Asn Asp Gly Lys Tyr  Tyr Phe Asn Asp Ser  Gly Ile Met
    2105                2110                2115

Gln Ile  Gly Phe Val Thr Ile  Asn Asn Glu Val Phe  Tyr Phe Ser
    2120                2125                2130

Asp Ser  Gly Ile Val Glu Ser  Gly Met Gln Asn Ile  Asp Asp Asn
    2135                2140                2145

Tyr Phe  Tyr Ile Asp Glu Asn  Gly Leu Val Gln Ile  Gly Val Phe
    2150                2155                2160
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Asp Thr  Ser Asp Gly Tyr Lys  Tyr Phe Ala Pro Ala  Asn Thr Val
    2165                 2170                 2175

Asn Asp  Asn Ile Tyr Gly Gln  Ala Val Glu Tyr Ser  Gly Leu Val
    2180                 2185                 2190

Arg Val  Gly Glu Asp Val Tyr  Tyr Phe Gly Glu Thr  Tyr Thr Ile
    2195                 2200                 2205

Glu Thr  Gly Trp Ile Tyr Asp  Met Glu Asn Glu Ser  Asp Lys Tyr
    2210                 2215                 2220

Tyr Phe  Asp Pro Glu Thr Lys  Lys Ala Tyr Lys Gly  Ile Asn Val
    2225                 2230                 2235

Ile Asp  Asp Ile Lys Tyr Tyr  Phe Asp Glu Asn Gly  Ile Met Arg
    2240                 2245                 2250

Thr Gly  Leu Ile Thr Phe Glu  Asp Asn His Tyr Tyr  Phe Asn Glu
    2255                 2260                 2265

Asp Gly  Ile Met Gln Tyr Gly  Tyr Ile Asn Ile Glu  Asp Lys Met
    2270                 2275                 2280

Phe Tyr  Phe Asn Glu Asp Gly  Val Met Gln Ile Gly  Val Phe Asn
    2285                 2290                 2295

Thr Ala  Asp Gly Phe Lys Tyr  Phe Ala His Gln Asn  Thr Leu Asp
    2300                 2305                 2310

Glu Asn  Phe Glu Gly Glu Ser  Ile Asn Tyr Thr Gly  Trp Leu Asp
    2315                 2320                 2325

Leu Asp  Glu Lys Arg Tyr Tyr  Phe Thr Asp Glu Tyr  Ile Ala Ala
    2330                 2335                 2340

Ile Gly  Ser Val Ile Ile Asp  Gly Glu Glu Tyr Tyr  Phe Asp Pro
    2345                 2350                 2355
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Asp Thr Ala Glu Leu Val Ile Ser Glu
2360 2365

<210> 128
<211> 2367
<212> PRT
<213> Clostridium difficile

<400> 128

Met Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg
1 5 10 15

Phe Arg Val Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
20 25 30

Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
35 40 45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Thr Tyr Ile Asp Thr Tyr Lys
50 55 60

Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65 70 75 80

Thr Glu Ile Leu Glu Leu Lys Asn Ser Asn Leu Thr Pro Val Glu Lys
85 90 95

Asn Leu His Phe Ile Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
100 105 110

Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
115 120 125

Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
130 135 140

Ile Ile Glu Ser Ala Ser Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145 150 155 160

Leu Asn Asp Pro Glu Phe Asn His Thr Ala Phe Phe Arg Lys Arg Met

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                165                 170                 175

Gln Ile Ile Tyr Asp Lys Gln Gln Asn Phe Ile Asn Tyr Tyr Lys Ala
            180                 185                 190

Gln Lys Glu Glu Asn Pro Asp Leu Ile Ile Asp Asp Ile Val Lys Thr
        195                 200                 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Asp Ile Asp Glu Leu Asn Ala Tyr
    210                 215                 220

Ile Glu Glu Ser Leu Asn Lys Val Thr Glu Asn Ser Gly Asn Asp Val
225                 230                 235                 240

Arg Asn Phe Glu Glu Phe Lys Thr Gly Glu Val Phe Asn Leu Tyr Glu
                245                 250                 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Gly Ala Ser Asp Ile Leu
            260                 265                 270

Arg Val Ala Ile Leu Lys Asn Ile Gly Gly Val Tyr Leu Asp Val Asp
        275                 280                 285

Met Leu Pro Gly Ile His Pro Asp Leu Phe Lys Asp Ile Asn Lys Pro
    290                 295                 300

Asp Ser Val Lys Thr Ala Val Asp Trp Glu Glu Met Gln Leu Glu Ala
305                 310                 315                 320

Ile Met Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Lys His Phe
                325                 330                 335

Asp Thr Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala
            340                 345                 350

Ser Lys Ser Asp Lys Ser Glu Ile Phe Leu Pro Leu Gly Asp Ile Glu
        355                 360                 365

Val Ser Pro Leu Glu Val Lys Ile Ala Phe Ala Lys Gly Ser Ile Ile
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    370                 375                 380

Asn Gln Ala Leu Ile Ser Ala Lys Asp Ser Tyr Cys Ser Asp Leu Leu
385                 390                 395                 400

Ile Lys Gln Ile Gln Asn Arg Tyr Lys Ile Leu Asn Asp Thr Leu Gly
                405                 410                 415

Pro Ile Ile Ser Gln Gly Asn Asp Phe Asn Thr Thr Met Asn Asn Phe
            420                 425                 430

Gly Glu Ser Leu Gly Ala Ile Ala Asn Glu Glu Asn Ile Ser Phe Ile
        435                 440                 445

Ala Lys Ile Gly Ser Tyr Leu Arg Val Gly Phe Tyr Pro Glu Ala Asn
    450                 455                 460

Thr Thr Ile Thr Leu Ser Gly Pro Thr Ile Tyr Ala Gly Ala Tyr Lys
465                 470                 475                 480

Asp Leu Leu Thr Phe Lys Glu Met Ser Ile Asp Thr Ser Ile Leu Ser
                485                 490                 495

Ser Glu Leu Arg Asn Phe Glu Phe Pro Lys Val Asn Ile Ser Gln Ala
            500                 505                 510

Thr Glu Gln Glu Lys Asn Ser Leu Trp Gln Phe Asn Glu Glu Arg Ala
        515                 520                 525

Lys Ile Gln Phe Glu Glu Tyr Lys Lys Asn Tyr Phe Glu Gly Ala Leu
    530                 535                 540

Gly Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Thr Val Ile Asp Lys
545                 550                 555                 560

Glu Tyr Leu Leu Glu Lys Ile Ser Ser Ser Thr Lys Ser Ser Glu Arg
                565                 570                 575

Gly Tyr Val His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr
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            580                 585                 590

Glu Ala Ala Cys Asn Leu Phe Ala Lys Asn Pro Tyr Asp Ser Ile Leu
        595                 600                 605

Phe Gln Lys Asn Ile Glu Asp Ser Glu Val Ala Tyr Tyr Tyr Asn Pro
    610                 615                 620

Thr Asp Ser Glu Ile Gln Glu Ile Asp Lys Tyr Arg Ile Pro Asp Arg
625                 630                 635                 640

Ile Ser Asp Arg Pro Lys Ile Lys Leu Thr Leu Ile Gly His Gly Lys
                645                 650                 655

Ala Glu Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu
            660                 665                 670

Ser Ser Glu Ile Glu Thr Ile Ile Asp Leu Ala Lys Ala Asp Ile Ser
        675                 680                 685

Pro Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr
    690                 695                 700

Ser Val Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Arg Val
705                 710                 715                 720

Lys Asp Lys Val Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile
                725                 730                 735

Ile Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
            740                 745                 750

Arg Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser
        755                 760                 765

Ile Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys
    770                 775                 780

Glu Asn Lys Ile Ile Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr
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785 790 795 800

Leu Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu
805 810 815

Glu Glu Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn
820 825 830

Ile Glu Thr Gln Val Val Glu Glu Arg Ile Glu Glu Ala Lys Ser Leu
835 840 845

Thr Ser Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu
850 855 860

Ser Ile Ser Asp Ala Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Glu
865 870 875 880

Glu Ser His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly
885 890 895

Phe Ser Ile Arg Phe Ile Asp Lys Glu Thr Gly Glu Ser Ile Phe Val
900 905 910

Glu Thr Glu Lys Ala Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu
915 920 925

Glu Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys
930 935 940

Leu Val Lys Lys Val Asn Leu Asp Ala Thr His Glu Val Asn Thr Leu
945 950 955 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys
965 970 975

Glu Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala
980 985 990

Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp Ala Ala Lys Val

995 1000 1005

Val Glu Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu
1010 1015 1020

Pro Thr Leu Ser Glu Gly Leu Pro Val Ile Ala Thr Ile Ile Asp
1025 1030 1035

Gly Val Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser
1040 1045 1050

Asp Pro Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met
1055 1060 1065

Ala Val Asn Leu Thr Ala Ala Thr Thr Ala Ile Ile Thr Ser Ser
1070 1075 1080

Leu Gly Ile Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala
1085 1090 1095

Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile
1100 1105 1110

Leu Arg Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Ser His Ile
1115 1120 1125

Ser Leu Ala Glu Ser Glu Gly Ala Phe Thr Ser Leu Asp Asp Lys
1130 1135 1140

Ile Met Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ser Ile Thr Leu Gly Lys Cys Glu Ile Trp Arg Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile

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1190 1195 1200

Tyr Asp Val Leu Glu Val Lys Lys Glu Glu Leu Asp Leu Ser Lys
1205 1210 1215

Asp Leu Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Gly Trp
1220 1225 1230

Glu Thr Gly Trp Thr Pro Gly Leu Arg Gly Leu Glu Asn Asp Gly
1235 1240 1245

Thr Lys Leu Leu Asp Arg Ile Arg Asp Gln Tyr Glu Gly Gln Phe
1250 1255 1260

Tyr Trp Arg Phe Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr
1265 1270 1275

Leu Lys Pro Arg Tyr Glu Asp Thr Asn Val Arg Ile Ser Leu Asp
1280 1285 1290

Ser Asn Thr Arg Ser Phe Ile Val Pro Val Ile Thr Thr Glu Tyr
1295 1300 1305

Ile Arg Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr
1310 1315 1320

Tyr Ala Leu Ser Leu Ser Gln Tyr Asn Met Asn Ile Asn Ile Glu
1325 1330 1335

Leu Asn Glu Asn Asp Thr Trp Val Ile Asp Val Asp Asn Val Val
1340 1345 1350

Arg Ser Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu
1355 1360 1365

Ile Glu Asn Ile Leu Ser Lys Leu Ser Ile Glu Asp Asn Lys Ile
1370 1375 1380

Ile Leu Asp Asn His Glu Ile Asn Phe Ser Gly Thr Leu Asn Gly

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1385 1390 1395

Gly Asn Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile
1400 1405 1410

Asn Ala Val Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Val
1415 1420 1425

Leu Ile Ser Gly Glu Leu Lys Thr Leu Met Ala Asn Ser Asn Ser
1430 1435 1440

Val Gln Gln Lys Ile Asp Tyr Ile Gly Leu Asn Ser Glu Leu Gln
1445 1450 1455

Lys Asn Ile Pro Tyr Ser Phe Met Asp Asp Lys Gly Lys Glu Asn
1460 1465 1470

Gly Phe Ile Asn Cys Ser Thr Lys Asp Gly Leu Phe Val Ser Glu
1475 1480 1485

Leu Ser Asp Val Val Leu Ile Ile Lys Val Tyr Met Asp Asn Ser
1490 1495 1500

Lys Pro Pro Phe Gly Tyr Tyr Ser Asn Asp Leu Lys Asp Val Lys
1505 1510 1515

Ala Ile Thr Lys Asp Asp Val Ile Ile Leu Thr Gly Tyr Tyr Leu
1520 1525 1530

Lys Asp Asp Ile Lys Ile Ser Leu Ser Phe Thr Ile Gln Asp Lys
1535 1540 1545

Asn Thr Ile Lys Leu Asn Gly Val Tyr Leu Asp Glu Asn Gly Val
1550 1555 1560

Ala Glu Ile Leu Lys Phe Met Asn Lys Lys Gly Ser Thr Asn Thr
1565 1570 1575

Ser Asp Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser

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1580 1585 1590

Ile Phe Ile Lys Ser Leu Lys Ser Asn Ala Lys Leu Ile Leu Asp
1595 1600 1605

Thr Asn Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu
1610 1615 1620

Phe Ile Cys Asp Lys Asp Asn Asn Ile Gln Pro Tyr Phe Ile Lys
1625 1630 1635

Phe Asn Thr Leu Glu Thr Lys Tyr Thr Leu Tyr Val Gly Asn Arg
1640 1645 1650

Gln Asn Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly
1655 1660 1665

Asp Ile Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr
1670 1675 1680

Gly Ile Asp Ser Cys Val Asn Lys Val Ile Ile Ser Pro Asn Ile
1685 1690 1695

Tyr Thr Asp Glu Ile Asn Ile Thr Pro Ile Tyr Glu Ala Asn Asn
1700 1705 1710

Thr Tyr Pro Glu Val Ile Val Leu Asp Thr Asn Tyr Ile Ser Glu
1715 1720 1725

Lys Ile Asn Ile Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp
1730 1735 1740

Ser Asn Asp Gly Ser Asp Phe Ile Leu Met Ser Thr Asp Glu Glu
1745 1750 1755

Asn Lys Val Ser Gln Val Lys Ile Arg Phe Thr Asn Val Phe Lys
1760 1765 1770

Gly Asn Thr Ile Ser Asp Lys Ile Ser Phe Asn Phe Ser Asp Lys

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1775 1780 1785

Gln Asp Val Ser Ile Asn Lys Ile Ile Ser Thr Phe Thr Pro Ser
1790 1795 1800

Tyr Tyr Val Glu Gly Leu Leu Asn Tyr His Leu Gly Leu Ile Ser
1805 1810 1815

Leu Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val
1820 1825 1830

Ser Gly Leu Val Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro
1835 1840 1845

Pro Ile Lys Asn Leu Ile Thr Gly Phe Thr Thr Ile Gly Asp Asp
1850 1855 1860

Lys Tyr Tyr Phe Asn Pro Asp Asn Gly Gly Ala Ala Ser Val Gly
1865 1870 1875

Glu Thr Ile Ile Asp Gly Lys Asn Tyr Tyr Phe Ser Pro Asn Gly
1880 1885 1890

Val Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr
1895 1900 1905

Phe Ala Pro Ala Asp Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala
1910 1915 1920

Ile Asp Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Val Tyr Tyr
1925 1930 1935

Phe Gly Asp Asn Tyr Arg Ala Ala Ile Glu Trp Gln Thr Leu Asp
1940 1945 1950

Asp Glu Val Tyr Tyr Phe Ser Thr Asp Thr Gly Arg Ala Phe Lys
1955 1960 1965

Gly Leu Asn Gln Ile Gly Asp Asp Lys Phe Tyr Phe Asn Ser Asp

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1970 1975 1980

Gly Ile Met Gln Lys Gly Phe Val Asn Ile Asn Asp Lys Thr Phe
1985 1990 1995

Tyr Phe Asp Asp Ser Gly Val Met Lys Ser Gly Tyr Thr Glu Ile
2000 2005 2010

Asp Gly Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile
2015 2020 2025

Gly Val Phe Asn Thr Ala Asp Gly Phe Lys Tyr Phe Ala His His
2030 2035 2040

Asp Glu Asp Leu Gly Asn Glu Glu Gly Glu Ala Leu Ser Tyr Ser
2045 2050 2055

Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser
2060 2065 2070

Phe Thr Ala Val Val Gly Trp Lys Asp Ser Glu Asp Gly Ser Lys
2075 2080 2085

Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Ile Ser
2090 2095 2100

Thr Ile Asn Asp Gly Lys Tyr Tyr Phe Asn Asp Ser Gly Ile Met
2105 2110 2115

Gln Ile Gly Phe Val Thr Ile Asn Asn Glu Val Phe Tyr Phe Ser
2120 2125 2130

Asp Ser Gly Ile Val Glu Ser Gly Met Gln Asn Ile Asp Asp Asn
2135 2140 2145

Tyr Phe Tyr Ile Asp Glu Asn Gly Leu Val Gln Ile Gly Val Phe
2150 2155 2160

Asp Thr Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val

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2165 2170 2175

Asn Asp Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val
2180 2185 2190

Arg Val Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile
2195 2200 2205

Glu Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr
2210 2215 2220

Tyr Phe Asp Pro Glu Thr Lys Lys Ala Tyr Lys Gly Ile Asn Val
2225 2230 2235

Ile Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Asn Gly Ile Met Arg
2240 2245 2250

Thr Gly Leu Ile Thr Phe Glu Asp Asn His Tyr Tyr Phe Asn Glu
2255 2260 2265

Asp Gly Ile Met Gln Tyr Gly Tyr Ile Asn Ile Glu Asp Lys Met
2270 2275 2280

Phe Tyr Phe Asn Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn
2285 2290 2295

Thr Ala Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp
2300 2305 2310

Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp
2315 2320 2325

Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala
2330 2335 2340

Ile Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro
2345 2350 2355

Asp Thr Ala Glu Leu Val Ile Ser Glu

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2360 2365

<210> 129
<211> 2366
<212> PRT
<213> Clostridium difficile

<400> 129

Met Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg
1 5 10 15

Phe Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
20 25 30

Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
35 40 45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
50 55 60

Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65 70 75 80

Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys
85 90 95

Asn Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
100 105 110

Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
115 120 125

Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
130 135 140

Val Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145 150 155 160

Leu Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met
165 170 175

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Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala
180 185 190

Gln Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr
195 200 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr
210 215 220

Ile Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val
225 230 235 240

Arg Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu
245 250 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu
260 265 270

Arg Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp
275 280 285

Met Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro
290 295 300

Ser Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile
305 310 315 320

Met Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp
325 330 335

Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
340 345 350

Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala
355 360 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn
370 375 380

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Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val
385                 390                 395                 400

Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro
                405                 410                 415

Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile
            420                 425                 430

Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met
        435                 440                 445

Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr
    450                 455                 460

Thr Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp
465                 470                 475                 480

Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala
                485                 490                 495

Asp Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr
            500                 505                 510

Glu Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys
        515                 520                 525

Ala Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly
    530                 535                 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu
545                 550                 555                 560

Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly
                565                 570                 575

Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
            580                 585                 590
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Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe
        595                 600                 605

Gln Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly
    610                 615                 620

Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile
625                 630                 635                 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp
                645                 650                 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser
            660                 665                 670

Thr Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro
        675                 680                 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser
    690                 695                 700

Ile Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys
705                 710                 715                 720

Asp Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
                725                 730                 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg
            740                 745                 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
        755                 760                 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
    770                 775                 780

Asn Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785                 790                 795                 800
```

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```
Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu
                805                 810                 815

Glu Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
            820                 825                 830

Asp Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr
        835                 840                 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser
    850                 855                 860

Ile Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp
865                 870                 875                 880

Ser His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe
                885                 890                 895

Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
            900                 905                 910

Thr Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu
        915                 920                 925

Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
    930                 935                 940

Val Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn
945                 950                 955                 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu
                965                 970                 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
            980                 985                 990

Leu Phe Ser Thr Gly Leu Asn Thr  Ile Thr Asp Ala Ala  Lys Val Val
        995                 1000                1005
```

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Glu Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu Pro
1010 1015 1020

Thr Leu Ser Glu Gly Leu Pro Ile Ile Ala Thr Ile Ile Asp Gly
1025 1030 1035

Val Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp
1040 1045 1050

Pro Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala
1055 1060 1065

Val Asn Leu Thr Thr Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu
1070 1075 1080

Gly Val Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly
1085 1090 1095

Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu
1100 1105 1110

Arg Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Val Ser
1115 1120 1125

Leu Val Glu Thr Glu Gly Val Phe Thr Leu Leu Asp Asp Lys Ile
1130 1135 1140

Met Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn
1145 1150 1155

Asn Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu
1160 1165 1170

Gly Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe
1175 1180 1185

Ser Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr
1190 1195 1200

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```
Asp Val  Leu Glu Val Gln Lys  Glu Glu Leu Asp Leu  Ser Lys Asp
    1205                 1210                 1215

Leu Met  Val Leu Pro Asn Ala  Pro Asn Arg Val Phe  Ala Trp Glu
    1220                 1225                 1230

Thr Gly  Trp Thr Pro Gly Leu  Arg Ser Leu Glu Asn  Asp Gly Thr
    1235                 1240                 1245

Lys Leu  Leu Asp Arg Ile Arg  Asp Asn Tyr Glu Gly  Glu Phe Tyr
    1250                 1255                 1260

Trp Arg  Tyr Phe Ala Phe Ile  Ala Asp Ala Leu Ile  Thr Thr Leu
    1265                 1270                 1275

Lys Pro  Arg Tyr Glu Asp Thr  Asn Ile Arg Ile Asn  Leu Asp Ser
    1280                 1285                 1290

Asn Thr  Arg Ser Phe Ile Val  Pro Ile Ile Thr Thr  Glu Tyr Ile
    1295                 1300                 1305

Arg Glu  Lys Leu Ser Tyr Ser  Phe Tyr Gly Ser Gly  Gly Thr Tyr
    1310                 1315                 1320

Ala Leu  Ser Leu Ser Gln Tyr  Asn Met Gly Ile Asn  Ile Glu Leu
    1325                 1330                 1335

Ser Glu  Ser Asp Val Trp Ile  Ile Asp Val Asp Asn  Val Val Arg
    1340                 1345                 1350

Asp Val  Thr Ile Glu Ser Asp  Lys Ile Lys Lys Gly  Asp Leu Ile
    1355                 1360                 1365

Glu Gly  Ile Leu Ser Thr Leu  Ser Ile Glu Glu Asn  Lys Ile Ile
    1370                 1375                 1380

Leu Asn  Ser His Glu Ile Asn  Phe Ser Gly Glu Val  Asn Gly Ser
    1385                 1390                 1395
```

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```
Asn Gly  Phe Val Ser Leu Thr  Phe Ser Ile Leu Glu  Gly Ile Asn
    1400                1405                1410

Ala Ile  Ile Glu Val Asp Leu  Leu Ser Lys Ser Tyr  Lys Leu Leu
    1415                1420                1425

Ile Ser  Gly Glu Leu Lys Ile  Leu Met Leu Asn Ser  Asn His Ile
    1430                1435                1440

Gln Gln  Lys Ile Asp Tyr Ile  Gly Phe Asn Ser Glu  Leu Gln Lys
    1445                1450                1455

Asn Ile  Pro Tyr Ser Phe Val  Asp Ser Glu Gly Lys  Glu Asn Gly
    1460                1465                1470

Phe Ile  Asn Gly Ser Thr Lys  Glu Gly Leu Phe Val  Ser Glu Leu
    1475                1480                1485

Pro Asp  Val Val Leu Ile Ser  Lys Val Tyr Met Asp  Asp Ser Lys
    1490                1495                1500

Pro Ser  Phe Gly Tyr Tyr Ser  Asn Asn Leu Lys Asp  Val Lys Val
    1505                1510                1515

Ile Thr  Lys Asp Asn Val Asn  Ile Leu Thr Gly Tyr  Tyr Leu Lys
    1520                1525                1530

Asp Asp  Ile Lys Ile Ser Leu  Ser Leu Thr Leu Gln  Asp Glu Lys
    1535                1540                1545

Thr Ile  Lys Leu Asn Ser Val  His Leu Asp Glu Ser  Gly Val Ala
    1550                1555                1560

Glu Ile  Leu Lys Phe Met Asn  Arg Lys Gly Asn Thr  Asn Thr Ser
    1565                1570                1575

Asp Ser  Leu Met Ser Phe Leu  Glu Ser Met Asn Ile  Lys Ser Ile
    1580                1585                1590
```

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```
Phe Val  Asn Phe Leu Gln Ser  Asn Ile Lys Phe Ile  Leu Asp Ala
    1595                1600                1605

Asn Phe  Ile Ile Ser Gly Thr  Thr Ser Ile Gly Gln  Phe Glu Phe
    1610                1615                1620

Ile Cys  Asp Glu Asn Asp Asn  Ile Gln Pro Tyr Phe  Ile Lys Phe
    1625                1630                1635

Asn Thr  Leu Glu Thr Asn Tyr  Thr Leu Tyr Val Gly  Asn Arg Gln
    1640                1645                1650

Asn Met  Ile Val Glu Pro Asn  Tyr Asp Leu Asp Asp  Ser Gly Asp
    1655                1660                1665

Ile Ser  Ser Thr Val Ile Asn  Phe Ser Gln Lys Tyr  Leu Tyr Gly
    1670                1675                1680

Ile Asp  Ser Cys Val Asn Lys  Val Val Ile Ser Pro  Asn Ile Tyr
    1685                1690                1695

Thr Asp  Glu Ile Asn Ile Thr  Pro Val Tyr Glu Thr  Asn Asn Thr
    1700                1705                1710

Tyr Pro  Glu Val Ile Val Leu  Asp Ala Asn Tyr Ile  Asn Glu Lys
    1715                1720                1725

Ile Asn  Val Asn Ile Asn Asp  Leu Ser Ile Arg Tyr  Val Trp Ser
    1730                1735                1740

Asn Asp  Gly Asn Asp Phe Ile  Leu Met Ser Thr Ser  Glu Glu Asn
    1745                1750                1755

Lys Val  Ser Gln Val Lys Ile  Arg Phe Val Asn Val  Phe Lys Asp
    1760                1765                1770

Lys Thr  Leu Ala Asn Lys Leu  Ser Phe Asn Phe Ser  Asp Lys Gln
    1775                1780                1785
```

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```
Asp Val  Pro Val Ser Glu Ile  Ile Leu Ser Phe Thr  Pro Ser Tyr
    1790                1795                1800

Tyr Glu  Asp Gly Leu Ile Gly  Tyr Asp Leu Gly Leu  Val Ser Leu
    1805                1810                1815

Tyr Asn  Glu Lys Phe Tyr Ile  Asn Asn Phe Gly Met  Met Val Ser
    1820                1825                1830

Gly Leu  Ile Tyr Ile Asn Asp  Ser Leu Tyr Tyr Phe  Lys Pro Pro
    1835                1840                1845

Val Asn  Asn Leu Ile Thr Gly  Phe Val Thr Val Gly  Asp Asp Lys
    1850                1855                1860

Tyr Tyr  Phe Asn Pro Ile Asn  Gly Gly Ala Ala Ser  Ile Gly Glu
    1865                1870                1875

Thr Ile  Ile Asp Asp Lys Asn  Tyr Tyr Phe Asn Gln  Ser Gly Val
    1880                1885                1890

Leu Gln  Thr Gly Val Phe Ser  Thr Glu Asp Gly Phe  Lys Tyr Phe
    1895                1900                1905

Ala Pro  Ala Asn Thr Leu Asp  Glu Asn Leu Glu Gly  Glu Ala Ile
    1910                1915                1920

Asp Phe  Thr Gly Lys Leu Ile  Ile Asp Glu Asn Ile  Tyr Tyr Phe
    1925                1930                1935

Asp Asp  Asn Tyr Arg Gly Ala  Val Glu Trp Lys Glu  Leu Asp Gly
    1940                1945                1950

Glu Met  His Tyr Phe Ser Pro  Glu Thr Gly Lys Ala  Phe Lys Gly
    1955                1960                1965

Leu Asn  Gln Ile Gly Asp Tyr  Lys Tyr Tyr Phe Asn  Ser Asp Gly
    1970                1975                1980
```

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Val Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr
1985 1990 1995

Phe Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp
2000 2005 2010

Gly Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly
2015 2020 2025

Val Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn
2030 2035 2040

Glu Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly
2045 2050 2055

Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe
2060 2065 2070

Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr
2075 2080 2085

Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu
2090 2095 2100

Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln
2105 2110 2115

Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp
2120 2125 2130

Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
2135 2140 2145

Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp
2150 2155 2160

Thr Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn
2165 2170 2175

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```
Asp Asn  Ile Tyr Gly Gln Ala  Val Glu Tyr Ser Gly  Leu Val Arg
    2180                2185                2190

Val Gly  Glu Asp Val Tyr Tyr  Phe Gly Glu Thr Tyr  Thr Ile Glu
    2195                2200                2205

Thr Gly  Trp Ile Tyr Asp Met  Glu Asn Glu Ser Asp  Lys Tyr Tyr
    2210                2215                2220

Phe Asn  Pro Glu Thr Lys Lys  Ala Cys Lys Gly Ile  Asn Leu Ile
    2225                2230                2235

Asp Asp  Ile Lys Tyr Tyr Phe  Asp Glu Lys Gly Ile  Met Arg Thr
    2240                2245                2250

Gly Leu  Ile Ser Phe Glu Asn  Asn Asn Tyr Tyr Phe  Asn Glu Asn
    2255                2260                2265

Gly Glu  Met Gln Phe Gly Tyr  Ile Asn Ile Glu Asp  Lys Met Phe
    2270                2275                2280

Tyr Phe  Gly Glu Asp Gly Val  Met Gln Ile Gly Val  Phe Asn Thr
    2285                2290                2295

Pro Asp  Gly Phe Lys Tyr Phe  Ala His Gln Asn Thr  Leu Asp Glu
    2300                2305                2310

Asn Phe  Glu Gly Glu Ser Ile  Asn Tyr Thr Gly Trp  Leu Asp Leu
    2315                2320                2325

Asp Glu  Lys Arg Tyr Tyr Phe  Thr Asp Glu Tyr Ile  Ala Ala Thr
    2330                2335                2340

Gly Ser  Val Ile Ile Asp Gly  Glu Glu Tyr Tyr Phe  Asp Pro Asp
    2345                2350                2355

Thr Ala  Gln Leu Val Ile Ser  Glu
    2360                2365
```

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<210> 130
<211> 2366
<212> PRT
<213> Clostridium difficile

<400> 130

Met Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg
1 5 10 15

Phe Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
20 25 30

Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
35 40 45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
50 55 60

Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65 70 75 80

Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys
85 90 95

Asn Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
100 105 110

Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
115 120 125

Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
130 135 140

Val Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145 150 155 160

Leu Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met
165 170 175

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```
Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala
            180                 185                 190

Gln Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr
        195                 200                 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr
    210                 215                 220

Ile Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val
225                 230                 235                 240

Arg Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu
                245                 250                 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu
            260                 265                 270

Arg Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp
        275                 280                 285

Met Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro
    290                 295                 300

Ser Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile
305                 310                 315                 320

Met Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp
                325                 330                 335

Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
            340                 345                 350

Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala
        355                 360                 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn
    370                 375                 380
```

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```
Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val
385                 390                 395                 400

Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro
                405                 410                 415

Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile
            420                 425                 430

Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met
        435                 440                 445

Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr
    450                 455                 460

Thr Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp
465                 470                 475                 480

Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala
                485                 490                 495

Asp Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr
            500                 505                 510

Glu Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys
        515                 520                 525

Ala Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly
    530                 535                 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu
545                 550                 555                 560

Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly
                565                 570                 575

Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
            580                 585                 590
```

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```
Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe
        595                 600                 605

Gln Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly
    610                 615                 620

Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile
625                 630                 635                 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp
                645                 650                 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser
            660                 665                 670

Thr Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro
        675                 680                 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser
    690                 695                 700

Ile Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys
705                 710                 715                 720

Asp Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
                725                 730                 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg
            740                 745                 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
        755                 760                 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
    770                 775                 780

Asn Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785                 790                 795                 800
```

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```
Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu
                805                 810                 815

Glu Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
            820                 825                 830

Asp Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr
        835                 840                 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser
    850                 855                 860

Ile Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp
865                 870                 875                 880

Ser His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe
                885                 890                 895

Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
            900                 905                 910

Thr Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu
        915                 920                 925

Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
    930                 935                 940

Val Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn
945                 950                 955                 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu
                965                 970                 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
            980                 985                 990

Leu Phe Ser Thr Gly Leu Asn Thr  Ile Thr Asp Ala Ala  Lys Val Val
        995                 1000                1005
```

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```
Glu Leu  Val Ser Thr Ala Leu  Asp Glu Thr Ile Asp  Leu Leu Pro
    1010                1015                1020

Thr Leu  Ser Glu Gly Leu Pro  Ile Ile Ala Thr Ile  Ile Asp Gly
    1025                1030                1035

Val Ser  Leu Gly Ala Ala Ile  Lys Glu Leu Ser Glu  Thr Ser Asp
    1040                1045                1050

Pro Leu  Leu Arg Gln Glu Ile  Glu Ala Lys Ile Gly  Ile Met Ala
    1055                1060                1065

Val Asn  Leu Thr Thr Ala Thr  Thr Ala Ile Ile Thr  Ser Ser Leu
    1070                1075                1080

Gly Ile  Ala Ser Gly Phe Ser  Ile Leu Leu Val Pro  Leu Ala Gly
    1085                1090                1095

Ile Ser  Ala Gly Ile Pro Ser  Leu Val Asn Asn Glu  Leu Val Leu
    1100                1105                1110

Arg Asp  Lys Ala Thr Lys Val  Val Asp Tyr Phe Lys  His Val Ser
    1115                1120                1125

Leu Val  Glu Thr Glu Gly Val  Phe Thr Leu Leu Asp  Asp Lys Ile
    1130                1135                1140

Met Met  Pro Gln Asp Asp Leu  Val Ile Ser Glu Ile  Asp Phe Asn
    1145                1150                1155

Asn Asn  Ser Ile Val Leu Gly  Lys Cys Glu Ile Trp  Arg Met Glu
    1160                1165                1170

Gly Gly  Ser Gly His Thr Val  Thr Asp Asp Ile Asp  His Phe Phe
    1175                1180                1185

Ser Ala  Pro Ser Ile Thr Tyr  Arg Glu Pro His Leu  Ser Ile Tyr
    1190                1195                1200
```

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Asp Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp
1205 1210 1215

Leu Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu
1220 1225 1230

Thr Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr
1235 1240 1245

Lys Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr
1250 1255 1260

Trp Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu
1265 1270 1275

Lys Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser
1280 1285 1290

Asn Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile
1295 1300 1305

Arg Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr
1310 1315 1320

Ala Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu
1325 1330 1335

Ser Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg
1340 1345 1350

Asp Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile
1355 1360 1365

Glu Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile
1370 1375 1380

Leu Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser
1385 1390 1395

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Asn Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn
1400 1405 1410

Ala Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu
1415 1420 1425

Ile Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile
1430 1435 1440

Gln Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys
1445 1450 1455

Asn Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly
1460 1465 1470

Phe Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu
1475 1480 1485

Pro Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys
1490 1495 1500

Pro Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val
1505 1510 1515

Ile Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys
1520 1525 1530

Asp Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys
1535 1540 1545

Thr Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala
1550 1555 1560

Glu Ile Leu Lys Phe Met Asn Arg Lys Gly Asn Thr Asn Thr Ser
1565 1570 1575

Asp Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile
1580 1585 1590

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```
Phe Val  Asn Phe Leu Gln Ser  Asn Ile Lys Phe Ile  Leu Asp Ala
    1595                1600                1605

Asn Phe  Ile Ile Ser Gly Thr  Thr Ser Ile Gly Gln  Phe Glu Phe
    1610                1615                1620

Ile Cys  Asp Glu Asn Asp Asn  Ile Gln Pro Tyr Phe  Ile Lys Phe
    1625                1630                1635

Asn Thr  Leu Glu Thr Asn Tyr  Thr Leu Tyr Val Gly  Asn Arg Gln
    1640                1645                1650

Asn Met  Ile Val Glu Pro Asn  Tyr Asp Leu Asp Asp  Ser Gly Asp
    1655                1660                1665

Ile Ser  Ser Thr Val Ile Asn  Phe Ser Gln Lys Tyr  Leu Tyr Gly
    1670                1675                1680

Ile Asp  Ser Cys Val Asn Lys  Val Val Ile Ser Pro  Asn Ile Tyr
    1685                1690                1695

Thr Asp  Glu Ile Asn Ile Thr  Pro Val Tyr Glu Thr  Asn Asn Thr
    1700                1705                1710

Tyr Pro  Glu Val Ile Val Leu  Asp Ala Asn Tyr Ile  Asn Glu Lys
    1715                1720                1725

Ile Asn  Val Asn Ile Asn Asp  Leu Ser Ile Arg Tyr  Val Trp Ser
    1730                1735                1740

Asn Asp  Gly Asn Asp Phe Ile  Leu Met Ser Thr Ser  Glu Glu Asn
    1745                1750                1755

Lys Val  Ser Gln Val Lys Ile  Arg Phe Val Asn Val  Phe Lys Asp
    1760                1765                1770

Lys Thr  Leu Ala Asn Lys Leu  Ser Phe Asn Phe Ser  Asp Lys Gln
    1775                1780                1785
```

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Asp Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr
1790 1795 1800

Tyr Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu
1805 1810 1815

Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser
1820 1825 1830

Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro
1835 1840 1845

Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys
1850 1855 1860

Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu
1865 1870 1875

Thr Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val
1880 1885 1890

Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
1895 1900 1905

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile
1910 1915 1920

Asp Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe
1925 1930 1935

Asp Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly
1940 1945 1950

Glu Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly
1955 1960 1965

Leu Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly
1970 1975 1980

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Val Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr
1985 1990 1995

Phe Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp
2000 2005 2010

Gly Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly
2015 2020 2025

Val Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn
2030 2035 2040

Glu Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly
2045 2050 2055

Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe
2060 2065 2070

Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr
2075 2080 2085

Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu
2090 2095 2100

Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln
2105 2110 2115

Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp
2120 2125 2130

Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
2135 2140 2145

Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp
2150 2155 2160

Thr Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn
2165 2170 2175

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Asp Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg
2180 2185 2190

Val Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu
2195 2200 2205

Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile
2225 2230 2235

Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr
2240 2245 2250

Gly Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn
2255 2260 2265

Gly Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe
2270 2275 2280

Tyr Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr
2285 2290 2295

Pro Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu
2300 2305 2310

Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu
2315 2320 2325

Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr
2330 2335 2340

Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp
2345 2350 2355

Thr Ala Gln Leu Val Ile Ser Glu
2360 2365

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<210> 131
<211> 2366
<212> PRT
<213> Clostridium difficile

<400> 131

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Phe Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
            20                  25                  30

Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
        35                  40                  45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
    50                  55                  60

Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65                  70                  75                  80

Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys
                85                  90                  95

Asn Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
            100                 105                 110

Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
        115                 120                 125

Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
    130                 135                 140

Val Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145                 150                 155                 160

Leu Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met
                165                 170                 175
```

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```
Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala
            180                 185                 190

Gln Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr
        195                 200                 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr
    210                 215                 220

Ile Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val
225                 230                 235                 240

Arg Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu
                245                 250                 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu
            260                 265                 270

Arg Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp
        275                 280                 285

Met Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro
    290                 295                 300

Ser Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile
305                 310                 315                 320

Met Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp
                325                 330                 335

Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
            340                 345                 350

Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala
        355                 360                 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn
    370                 375                 380
```

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```
Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val
385                 390                 395                 400

Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro
                405                 410                 415

Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile
            420                 425                 430

Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met
        435                 440                 445

Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr
    450                 455                 460

Thr Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp
465                 470                 475                 480

Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala
                485                 490                 495

Asp Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr
            500                 505                 510

Glu Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys
        515                 520                 525

Ala Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly
    530                 535                 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu
545                 550                 555                 560

Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly
                565                 570                 575

Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
            580                 585                 590
```

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```
Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe
        595                 600                 605

Gln Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly
    610                 615                 620

Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile
625                 630                 635                 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp
                645                 650                 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser
            660                 665                 670

Thr Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro
        675                 680                 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser
    690                 695                 700

Ile Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys
705                 710                 715                 720

Asp Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
                725                 730                 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg
            740                 745                 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
        755                 760                 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
    770                 775                 780

Asn Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785                 790                 795                 800
```

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```
Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu
                805                 810                 815

Glu Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
            820                 825                 830

Asp Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr
        835                 840                 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser
    850                 855                 860

Ile Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp
865                 870                 875                 880

Ser His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe
                885                 890                 895

Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
            900                 905                 910

Thr Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu
        915                 920                 925

Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
    930                 935                 940

Val Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn
945                 950                 955                 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu
                965                 970                 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
            980                 985                 990

Leu Phe Ser Thr Gly Leu Asn Thr  Ile Thr Asp Ala Ala  Lys Val Val
        995                 1000                1005
```

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Glu Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu Pro
1010 1015 1020

Thr Leu Ser Glu Gly Leu Pro Ile Ile Ala Thr Ile Ile Asp Gly
1025 1030 1035

Val Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp
1040 1045 1050

Pro Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala
1055 1060 1065

Val Asn Leu Thr Thr Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu
1070 1075 1080

Gly Ile Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly
1085 1090 1095

Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu
1100 1105 1110

Arg Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Val Ser
1115 1120 1125

Leu Val Glu Thr Glu Gly Val Phe Thr Leu Leu Asp Asp Lys Ile
1130 1135 1140

Met Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn
1145 1150 1155

Asn Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu
1160 1165 1170

Gly Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe
1175 1180 1185

Ser Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr
1190 1195 1200

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```
Asp Val  Leu Glu Val Gln Lys  Glu Glu Leu Asp Leu  Ser Lys Asp
    1205                 1210                 1215

Leu Met  Val Leu Pro Asn Ala  Pro Asn Arg Val Phe  Ala Trp Glu
    1220                 1225                 1230

Thr Gly  Trp Thr Pro Gly Leu  Arg Ser Leu Glu Asn  Asp Gly Thr
    1235                 1240                 1245

Lys Leu  Leu Asp Arg Ile Arg  Asp Asn Tyr Glu Gly  Glu Phe Tyr
    1250                 1255                 1260

Trp Arg  Tyr Phe Ala Phe Ile  Ala Asp Ala Leu Ile  Thr Thr Leu
    1265                 1270                 1275

Lys Pro  Arg Tyr Glu Asp Thr  Asn Ile Arg Ile Asn  Leu Asp Ser
    1280                 1285                 1290

Asn Thr  Arg Ser Phe Ile Val  Pro Ile Ile Thr Thr  Glu Tyr Ile
    1295                 1300                 1305

Arg Glu  Lys Leu Ser Tyr Ser  Phe Tyr Gly Ser Gly  Gly Thr Tyr
    1310                 1315                 1320

Ala Leu  Ser Leu Ser Gln Tyr  Asn Met Gly Ile Asn  Ile Glu Leu
    1325                 1330                 1335

Ser Glu  Ser Asp Val Trp Ile  Ile Asp Val Asp Asn  Val Val Arg
    1340                 1345                 1350

Asp Val  Thr Ile Glu Ser Asp  Lys Ile Lys Lys Gly  Asp Leu Ile
    1355                 1360                 1365

Glu Gly  Ile Leu Ser Thr Leu  Ser Ile Glu Glu Asn  Lys Ile Ile
    1370                 1375                 1380

Leu Asn  Ser His Glu Ile Asn  Phe Ser Gly Glu Val  Asn Gly Ser
    1385                 1390                 1395
```

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```
Asn Gly  Phe Val Ser Leu Thr  Phe Ser Ile Leu Glu  Gly Ile Asn
    1400                1405                1410

Ala Ile  Ile Glu Val Asp Leu  Leu Ser Lys Ser Tyr  Lys Leu Leu
    1415                1420                1425

Ile Ser  Gly Glu Leu Lys Ile  Leu Met Leu Asn Ser  Asn His Ile
    1430                1435                1440

Gln Gln  Lys Ile Asp Tyr Ile  Gly Phe Asn Ser Glu  Leu Gln Lys
    1445                1450                1455

Asn Ile  Pro Tyr Ser Phe Val  Asp Ser Glu Gly Lys  Glu Asn Gly
    1460                1465                1470

Phe Ile  Asn Gly Ser Thr Lys  Glu Gly Leu Phe Val  Ser Glu Leu
    1475                1480                1485

Pro Asp  Val Val Leu Ile Ser  Lys Val Tyr Met Asp  Asp Ser Lys
    1490                1495                1500

Pro Ser  Phe Gly Tyr Tyr Ser  Asn Asn Leu Lys Asp  Val Lys Val
    1505                1510                1515

Ile Thr  Lys Asp Asn Val Asn  Ile Leu Thr Gly Tyr  Tyr Leu Lys
    1520                1525                1530

Asp Asp  Ile Lys Ile Ser Leu  Ser Leu Thr Leu Gln  Asp Glu Lys
    1535                1540                1545

Thr Ile  Lys Leu Asn Ser Val  His Leu Asp Glu Ser  Gly Val Ala
    1550                1555                1560

Glu Ile  Leu Lys Phe Met Asn  Arg Lys Gly Asn Thr  Asn Thr Ser
    1565                1570                1575

Asp Ser  Leu Met Ser Phe Leu  Glu Ser Met Asn Ile  Lys Ser Ile
    1580                1585                1590
```

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```
Phe Val  Asn Phe Leu Gln Ser  Asn Ile Lys Phe Ile  Leu Asp Ala
    1595                1600                1605

Asn Phe  Ile Ile Ser Gly Thr  Thr Ser Ile Gly Gln  Phe Glu Phe
    1610                1615                1620

Ile Cys  Asp Glu Asn Asp Asn  Ile Gln Pro Tyr Phe  Ile Lys Phe
    1625                1630                1635

Asn Thr  Leu Glu Thr Asn Tyr  Thr Leu Tyr Val Gly  Asn Arg Gln
    1640                1645                1650

Asn Met  Ile Val Glu Pro Asn  Tyr Asp Leu Asp Asp  Ser Gly Asp
    1655                1660                1665

Ile Ser  Ser Thr Val Ile Asn  Phe Ser Gln Lys Tyr  Leu Tyr Gly
    1670                1675                1680

Ile Asp  Ser Cys Val Asn Lys  Val Val Ile Ser Pro  Asn Ile Tyr
    1685                1690                1695

Thr Asp  Glu Ile Asn Ile Thr  Pro Val Tyr Glu Thr  Asn Asn Thr
    1700                1705                1710

Tyr Pro  Glu Val Ile Val Leu  Asp Ala Asn Tyr Ile  Asn Glu Lys
    1715                1720                1725

Ile Asn  Val Asn Ile Asn Asp  Leu Ser Ile Arg Tyr  Val Trp Ser
    1730                1735                1740

Asn Asp  Gly Asn Asp Phe Ile  Leu Met Ser Thr Ser  Glu Glu Asn
    1745                1750                1755

Lys Val  Ser Gln Val Lys Ile  Arg Phe Val Asn Val  Phe Lys Asp
    1760                1765                1770

Lys Thr  Leu Ala Asn Lys Leu  Ser Phe Asn Phe Ser  Asp Lys Gln
    1775                1780                1785
```

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```
Asp Val  Pro Val Ser Glu Ile  Ile Leu Ser Phe Thr  Pro Ser Tyr
    1790                1795                1800

Tyr Glu  Asp Gly Leu Ile Gly  Tyr Asp Leu Gly Leu  Val Ser Leu
    1805                1810                1815

Tyr Asn  Glu Lys Phe Tyr Ile  Asn Asn Phe Gly Met  Met Leu Ser
    1820                1825                1830

Gly Leu  Ile Tyr Ile Asn Asp  Ser Leu Tyr Tyr Phe  Lys Pro Pro
    1835                1840                1845

Val Asn  Asn Leu Ile Thr Gly  Phe Val Thr Val Gly  Asp Asp Lys
    1850                1855                1860

Tyr Tyr  Phe Asn Pro Ile Asn  Gly Gly Ala Ala Ser  Ile Gly Glu
    1865                1870                1875

Thr Ile  Ile Asp Asp Lys Asn  Tyr Tyr Phe Asn Gln  Ser Gly Val
    1880                1885                1890

Leu Gln  Thr Gly Val Phe Ser  Thr Glu Asp Gly Phe  Lys Tyr Phe
    1895                1900                1905

Ala Pro  Ala Asn Thr Leu Asp  Glu Asn Leu Glu Gly  Glu Ala Ile
    1910                1915                1920

Asp Phe  Thr Gly Lys Leu Ile  Ile Asp Glu Asn Ile  Tyr Tyr Phe
    1925                1930                1935

Asp Asp  Asn Tyr Arg Gly Ala  Val Glu Trp Lys Glu  Leu Asp Gly
    1940                1945                1950

Glu Met  His Tyr Phe Ser Pro  Glu Thr Gly Lys Ala  Phe Lys Gly
    1955                1960                1965

Leu Asn  Gln Ile Gly Asp Asp  Lys Tyr Tyr Phe Asn  Ser Asp Gly
    1970                1975                1980
```

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```
Val Met  Gln Lys Gly Phe Val  Ser Ile Asn Asp Asn  Lys His Tyr
    1985                1990                1995

Phe Asp  Asp Ser Gly Val Met  Lys Val Gly Tyr Thr  Glu Ile Asp
    2000                2005                2010

Gly Lys  His Phe Tyr Phe Ala  Glu Asn Gly Glu Met  Gln Ile Gly
    2015                2020                2025

Val Phe  Asn Thr Glu Asp Gly  Phe Lys Tyr Phe Ala  His His Asn
    2030                2035                2040

Glu Asp  Leu Gly Asn Glu Glu  Gly Glu Glu Ile Ser  Tyr Ser Gly
    2045                2050                2055

Ile Leu  Asn Phe Asn Asn Lys  Ile Tyr Tyr Phe Asp  Asp Ser Phe
    2060                2065                2070

Thr Ala  Val Val Gly Trp Lys  Asp Leu Glu Asp Gly  Ser Lys Tyr
    2075                2080                2085

Tyr Phe  Asp Glu Asp Thr Ala  Glu Ala Tyr Ile Gly  Leu Ser Leu
    2090                2095                2100

Ile Asn  Asp Gly Gln Tyr Tyr  Phe Asn Asp Asp Gly  Ile Met Gln
    2105                2110                2115

Val Gly  Phe Val Thr Ile Asn  Asp Lys Val Phe Tyr  Phe Ser Asp
    2120                2125                2130

Ser Gly  Ile Ile Glu Ser Gly  Val Gln Asn Ile Asp  Asp Asn Tyr
    2135                2140                2145

Phe Tyr  Ile Asp Asp Asn Gly  Ile Val Gln Ile Gly  Val Phe Asp
    2150                2155                2160

Thr Ser  Asp Gly Tyr Lys Tyr  Phe Ala Pro Ala Asn  Thr Val Asn
    2165                2170                2175
```

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```
Asp Asn  Ile Tyr Gly Gln Ala  Val Glu Tyr Ser Gly  Leu Val Arg
    2180                 2185                 2190

Val Gly  Glu Asp Val Tyr Tyr  Phe Gly Glu Thr Tyr  Thr Ile Glu
    2195                 2200                 2205

Thr Gly  Trp Ile Tyr Asp Met  Glu Asn Glu Ser Asp  Lys Tyr Tyr
    2210                 2215                 2220

Phe Asn  Pro Glu Thr Lys Lys  Ala Cys Lys Gly Ile  Asn Leu Ile
    2225                 2230                 2235

Asp Asp  Ile Lys Tyr Tyr Phe  Asp Glu Lys Gly Ile  Met Arg Thr
    2240                 2245                 2250

Gly Leu  Ile Ser Phe Glu Asn  Asn Asn Tyr Tyr Phe  Asn Glu Asn
    2255                 2260                 2265

Gly Glu  Met Gln Phe Gly Tyr  Ile Asn Ile Glu Asp  Lys Met Phe
    2270                 2275                 2280

Tyr Phe  Gly Glu Asp Gly Val  Met Gln Ile Gly Val  Phe Asn Thr
    2285                 2290                 2295

Pro Asp  Gly Phe Lys Tyr Phe  Ala His Gln Asn Thr  Leu Asp Glu
    2300                 2305                 2310

Asn Phe  Glu Gly Glu Ser Ile  Asn Tyr Thr Gly Trp  Leu Asp Leu
    2315                 2320                 2325

Asp Glu  Lys Arg Tyr Tyr Phe  Thr Asp Glu Tyr Ile  Ala Ala Thr
    2330                 2335                 2340

Gly Ser  Val Ile Ile Asp Gly  Glu Glu Tyr Tyr Phe  Asp Pro Asp
    2345                 2350                 2355

Thr Ala  Gln Leu Val Ile Ser  Glu
    2360                 2365
```

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<210> 132
<211> 2366
<212> PRT
<213> Clostridium difficile

<400> 132

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Met Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg
1               5                   10                  15

Phe Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
            20                  25                  30

Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
        35                  40                  45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
    50                  55                  60

Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65                  70                  75                  80

Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys
                85                  90                  95

Asn Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
            100                 105                 110

Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
        115                 120                 125

Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
    130                 135                 140

Val Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145                 150                 155                 160

Leu Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met
                165                 170                 175

Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala
```

```
            180                 185                 190

Gln Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr
        195                 200                 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr
    210                 215                 220

Ile Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val
225                 230                 235                 240

Arg Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu
                245                 250                 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu
            260                 265                 270

Arg Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp
        275                 280                 285

Met Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro
    290                 295                 300

Ser Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile
305                 310                 315                 320

Met Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp
                325                 330                 335

Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
            340                 345                 350

Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala
        355                 360                 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn
    370                 375                 380

Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val
```

385 390 395 400

Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro
405 410 415

Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile
420 425 430

Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met
435 440 445

Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr
450 455 460

Thr Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp
465 470 475 480

Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala
485 490 495

Asp Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr
500 505 510

Glu Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys
515 520 525

Ala Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly
530 535 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu
545 550 555 560

Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly
565 570 575

Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
580 585 590

Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe

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595 600 605

Gln Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly
610 615 620

Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile
625 630 635 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp
645 650 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser
660 665 670

Thr Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro
675 680 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser
690 695 700

Ile Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys
705 710 715 720

Asp Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
725 730 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg
740 745 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
755 760 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
770 775 780

Asn Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785 790 795 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu

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805 810 815

Glu Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
820 825 830

Asp Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr
835 840 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser
850 855 860

Ile Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp
865 870 875 880

Ser His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe
885 890 895

Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
900 905 910

Thr Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu
915 920 925

Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
930 935 940

Val Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn
945 950 955 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu
965 970 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
980 985 990

Leu Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp Ala Ala Lys Val Val
995 1000 1005

Glu Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu Pro

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1010 1015 1020

Thr Leu Ser Glu Gly Leu Pro Ile Ile Ala Thr Ile Ile Asp Gly
1025 1030 1035

Val Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp
1040 1045 1050

Pro Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala
1055 1060 1065

Val Asn Leu Thr Thr Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu
1070 1075 1080

Gly Val Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly
1085 1090 1095

Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu
1100 1105 1110

Arg Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Val Ser
1115 1120 1125

Leu Val Glu Thr Glu Gly Val Phe Thr Leu Leu Asp Asp Lys Ile
1130 1135 1140

Met Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn
1145 1150 1155

Asn Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu
1160 1165 1170

Gly Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe
1175 1180 1185

Ser Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr
1190 1195 1200

Asp Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp

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    1205                1210                1215

Leu Met  Val Leu Pro Asn Ala  Pro Asn Arg Val Phe  Ala Trp Glu
    1220                1225                1230

Thr Gly  Trp Thr Pro Gly Leu  Arg Ser Leu Glu Asn  Asp Gly Thr
    1235                1240                1245

Lys Leu  Leu Asp Arg Ile Arg  Asp Asn Tyr Glu Gly  Glu Phe Tyr
    1250                1255                1260

Trp Arg  Tyr Phe Ala Phe Ile  Ala Asp Ala Leu Ile  Thr Thr Leu
    1265                1270                1275

Lys Pro  Arg Tyr Glu Asp Thr  Asn Ile Arg Ile Asn  Leu Asp Ser
    1280                1285                1290

Asn Thr  Arg Ser Phe Ile Val  Pro Ile Ile Thr Thr  Glu Tyr Ile
    1295                1300                1305

Arg Glu  Lys Leu Ser Tyr Ser  Phe Tyr Gly Ser Gly  Gly Thr Tyr
    1310                1315                1320

Ala Leu  Ser Leu Ser Gln Tyr  Asn Met Gly Ile Asn  Ile Glu Leu
    1325                1330                1335

Ser Glu  Ser Asp Val Trp Ile  Ile Asp Val Asp Asn  Val Val Arg
    1340                1345                1350

Asp Val  Thr Ile Glu Ser Asp  Lys Ile Lys Lys Gly  Asp Leu Ile
    1355                1360                1365

Glu Gly  Ile Leu Ser Thr Leu  Ser Ile Glu Glu Asn  Lys Ile Ile
    1370                1375                1380

Leu Asn  Ser His Glu Ile Asn  Phe Ser Gly Glu Val  Asn Gly Ser
    1385                1390                1395

Asn Gly  Phe Val Ser Leu Thr  Phe Ser Ile Leu Glu  Gly Ile Asn
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1400 1405 1410

Ala Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu
1415 1420 1425

Ile Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile
1430 1435 1440

Gln Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys
1445 1450 1455

Asn Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly
1460 1465 1470

Phe Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu
1475 1480 1485

Pro Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys
1490 1495 1500

Pro Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val
1505 1510 1515

Ile Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys
1520 1525 1530

Asp Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys
1535 1540 1545

Thr Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala
1550 1555 1560

Glu Ile Leu Lys Phe Met Asn Arg Lys Gly Asn Thr Asn Thr Ser
1565 1570 1575

Asp Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile
1580 1585 1590

Phe Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala

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1595 1600 1605

Asn Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe
1610 1615 1620

Ile Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe
1625 1630 1635

Asn Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln
1640 1645 1650

Asn Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp
1655 1660 1665

Ile Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly
1670 1675 1680

Ile Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr
1685 1690 1695

Thr Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr
1700 1705 1710

Tyr Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys
1715 1720 1725

Ile Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser
1730 1735 1740

Asn Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn
1745 1750 1755

Lys Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp
1760 1765 1770

Lys Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln
1775 1780 1785

Asp Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr

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1790 1795 1800

Tyr Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu
1805 1810 1815

Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser
1820 1825 1830

Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro
1835 1840 1845

Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys
1850 1855 1860

Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu
1865 1870 1875

Thr Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val
1880 1885 1890

Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
1895 1900 1905

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile
1910 1915 1920

Asp Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe
1925 1930 1935

Asp Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly
1940 1945 1950

Glu Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly
1955 1960 1965

Leu Asn Gln Ile Gly Asp Tyr Lys Tyr Tyr Phe Asn Ser Asp Gly
1970 1975 1980

Val Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr

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1985 1990 1995

Phe Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp
2000 2005 2010

Gly Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly
2015 2020 2025

Val Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn
2030 2035 2040

Glu Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly
2045 2050 2055

Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe
2060 2065 2070

Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr
2075 2080 2085

Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu
2090 2095 2100

Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln
2105 2110 2115

Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp
2120 2125 2130

Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
2135 2140 2145

Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp
2150 2155 2160

Thr Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn
2165 2170 2175

Asp Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg

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2180 2185 2190

Val Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu
2195 2200 2205

Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile
2225 2230 2235

Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr
2240 2245 2250

Gly Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn
2255 2260 2265

Gly Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe
2270 2275 2280

Tyr Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr
2285 2290 2295

Pro Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu
2300 2305 2310

Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu
2315 2320 2325

Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr
2330 2335 2340

Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp
2345 2350 2355

Thr Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 133

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<211> 2366
<212> PRT
<213> Clostridium difficile

<400> 133

Met Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg
1 5 10 15

Phe Arg Val Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
20 25 30

Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
35 40 45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
50 55 60

Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65 70 75 80

Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys
85 90 95

Asn Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
100 105 110

Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
115 120 125

Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
130 135 140

Ile Val Glu Ser Ala Thr Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145 150 155 160

Leu Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Tyr Arg Lys Arg Met
165 170 175

Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Thr
180 185 190

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Gln Arg Glu Glu Asn Pro Asp Leu Ile Ile Asp Asp Ile Val Lys Ile
        195                 200                 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Asp Ile Asp Glu Leu Asn Ser Tyr
    210                 215                 220

Ile Glu Glu Ser Leu Asn Lys Val Thr Glu Asn Ser Gly Asn Asp Val
225                 230                 235                 240

Arg Asn Phe Glu Glu Phe Lys Gly Gly Glu Ser Phe Lys Leu Tyr Glu
                245                 250                 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu
            260                 265                 270

Arg Ile Ser Ala Leu Lys Glu Val Gly Gly Val Tyr Leu Asp Val Asp
        275                 280                 285

Met Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro
    290                 295                 300

Ser Ser Val Thr Val Asp Phe Trp Glu Met Val Lys Leu Glu Ala Ile
305                 310                 315                 320

Met Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp
                325                 330                 335

Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
            340                 345                 350

Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala
        355                 360                 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn
    370                 375                 380

Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val
385                 390                 395                 400
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Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro
                405                 410                 415

Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Ala Phe Ile
            420                 425                 430

Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met
        435                 440                 445

Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr
    450                 455                 460

Thr Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp
465                 470                 475                 480

Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala
                485                 490                 495

Asp Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr
            500                 505                 510

Glu Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys
        515                 520                 525

Ala Gln Phe Glu Glu Tyr Lys Lys Asn Tyr Phe Glu Gly Ser Leu Gly
    530                 535                 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Thr Val Val Asp Lys Glu
545                 550                 555                 560

Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly
                565                 570                 575

Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
            580                 585                 590

Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe
        595                 600                 605
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```
Gln Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly
    610                 615                 620

Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile
625                 630                 635                 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp
                645                 650                 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser
            660                 665                 670

Thr Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro
        675                 680                 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser
    690                 695                 700

Val Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Arg Val Lys
705                 710                 715                 720

Asp Lys Val Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
                725                 730                 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg
            740                 745                 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
        755                 760                 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
    770                 775                 780

Asn Lys Ile Ile Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785                 790                 795                 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu
                805                 810                 815
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Glu Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
            820                 825                 830

Asp Thr Gln Val Val Glu Gly Arg Ile Glu Glu Ala Lys Ser Leu Thr
        835                 840                 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser
    850                 855                 860

Ile Ser Asp Ala Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Glu Glu
865                 870                 875                 880

Ser His Phe Ile Ser Phe Glu Asp Ile Leu Glu Thr Asp Glu Gly Phe
                885                 890                 895

Ser Ile Arg Phe Ile Asp Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
            900                 905                 910

Thr Glu Lys Ala Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu
        915                 920                 925

Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
    930                 935                 940

Val Lys Lys Val Asn Leu Asp Ala Thr His Glu Val Asn Thr Leu Asn
945                 950                 955                 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu
                965                 970                 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
            980                 985                 990

Leu Phe Ser Thr Gly Leu Asn Thr  Ile Thr Asp Ala Ala  Lys Val Val
        995                 1000                1005

Glu Leu  Val Ser Thr Ala Leu  Asp Glu Thr Ile Asp  Leu Leu Pro
    1010                1015                1020
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Thr Leu  Ser Glu Gly Leu Pro  Val Ile Ala Thr Ile  Ile Asp Gly
    1025                1030                1035

Val Ser  Leu Gly Ala Ala Ile  Lys Glu Leu Ser Glu  Thr Ser Asp
    1040                1045                1050

Pro Leu  Leu Arg Gln Glu Ile  Glu Ala Lys Ile Gly  Ile Met Ala
    1055                1060                1065

Val Asn  Leu Thr Ala Ala Thr  Thr Ala Ile Ile Thr  Ser Ser Leu
    1070                1075                1080

Gly Ile  Ala Ser Gly Phe Ser  Ile Leu Leu Val Pro  Leu Ala Gly
    1085                1090                1095

Ile Ser  Ala Gly Ile Pro Ser  Leu Val Asn Asn Glu  Leu Ile Leu
    1100                1105                1110

Arg Asp  Lys Ala Thr Lys Val  Val Asp Tyr Phe Ser  His Ile Ser
    1115                1120                1125

Leu Ala  Glu Ser Glu Gly Ala  Phe Thr Ser Leu Asp  Asp Lys Ile
    1130                1135                1140

Met Met  Pro Gln Asp Asp Leu  Val Ile Ser Glu Ile  Asp Phe Asn
    1145                1150                1155

Asn Asn  Ser Ile Thr Leu Gly  Lys Cys Glu Ile Trp  Arg Met Glu
    1160                1165                1170

Gly Gly  Ser Gly His Thr Val  Thr Asp Asp Ile Asp  His Phe Phe
    1175                1180                1185

Ser Ala  Pro Ser Ile Thr Tyr  Arg Glu Pro His Leu  Ser Ile Tyr
    1190                1195                1200

Asp Val  Leu Glu Val Gln Lys  Glu Glu Leu Asp Leu  Ser Lys Asp
    1205                1210                1215
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Leu Met  Val Leu Pro Asn Ala  Pro Asn Arg Val Phe  Ala Trp Glu
    1220                1225                1230

Thr Gly  Trp Thr Pro Gly Leu  Arg Ser Leu Glu Asn  Asp Gly Thr
    1235                1240                1245

Lys Leu  Leu Asp Arg Ile Arg  Asp Asn Tyr Glu Gly  Glu Phe Tyr
    1250                1255                1260

Trp Arg  Tyr Phe Ala Phe Ile  Ala Asp Ala Leu Ile  Thr Thr Leu
    1265                1270                1275

Lys Pro  Arg Tyr Glu Asp Thr  Asn Ile Arg Ile Asn  Leu Asp Ser
    1280                1285                1290

Asn Thr  Arg Ser Phe Ile Val  Pro Val Ile Thr Thr  Glu Tyr Ile
    1295                1300                1305

Arg Glu  Lys Leu Ser Tyr Ser  Phe Tyr Gly Ser Gly  Gly Thr Tyr
    1310                1315                1320

Ala Leu  Ser Leu Ser Gln Tyr  Asn Met Asn Ile Asn  Ile Glu Leu
    1325                1330                1335

Asn Glu  Asn Asp Thr Trp Val  Ile Asp Val Asp Asn  Val Val Arg
    1340                1345                1350

Asp Val  Thr Ile Glu Ser Asp  Lys Ile Lys Lys Gly  Asp Leu Ile
    1355                1360                1365

Glu Asn  Ile Leu Ser Lys Leu  Ser Ile Glu Asp Asn  Lys Ile Ile
    1370                1375                1380

Leu Asp  Asn His Glu Ile Asn  Phe Ser Gly Thr Leu  Asn Gly Gly
    1385                1390                1395

Asn Gly  Phe Val Ser Leu Thr  Phe Ser Ile Leu Glu  Gly Ile Asn
    1400                1405                1410
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Ala Val Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Val Leu
1415 1420 1425

Ile Ser Gly Glu Leu Lys Thr Leu Met Ala Asn Ser Asn Ser Val
1430 1435 1440

Gln Gln Lys Ile Asp Tyr Ile Gly Leu Asn Ser Glu Leu Gln Lys
1445 1450 1455

Asn Ile Pro Tyr Ser Phe Met Asp Asp Lys Gly Lys Glu Asn Gly
1460 1465 1470

Phe Ile Asn Cys Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu
1475 1480 1485

Ser Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asn Ser Lys
1490 1495 1500

Pro Leu Phe Gly Tyr Cys Ser Asn Asp Leu Lys Asp Val Lys Val
1505 1510 1515

Ile Thr Lys Asp Asp Val Ile Ile Leu Thr Gly Tyr Tyr Leu Lys
1520 1525 1530

Asp Asp Ile Lys Ile Ser Leu Ser Phe Thr Ile Gln Asp Glu Asn
1535 1540 1545

Thr Ile Lys Leu Asn Gly Val Tyr Leu Asp Glu Asn Gly Val Ala
1550 1555 1560

Glu Ile Leu Lys Phe Met Asn Lys Lys Gly Ser Thr Asn Thr Ser
1565 1570 1575

Asp Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile
1580 1585 1590

Phe Ile Asn Ser Leu Gln Ser Asn Thr Lys Leu Ile Leu Asp Thr
1595 1600 1605

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Asn Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe
1610 1615 1620

Ile Cys Asp Lys Asp Asn Asn Ile Gln Pro Tyr Phe Ile Lys Phe
1625 1630 1635

Asn Thr Leu Glu Thr Lys Tyr Thr Leu Tyr Val Gly Asn Arg Gln
1640 1645 1650

Asn Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp
1655 1660 1665

Ile Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly
1670 1675 1680

Ile Asp Ser Cys Val Asn Lys Val Ile Ile Ser Pro Asn Ile Tyr
1685 1690 1695

Thr Asp Glu Ile Asn Ile Thr Pro Ile Tyr Glu Ala Asn Asn Thr
1700 1705 1710

Tyr Pro Glu Val Ile Val Leu Asp Thr Asn Tyr Ile Ser Glu Lys
1715 1720 1725

Ile Asn Ile Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser
1730 1735 1740

Asn Asp Gly Ser Asp Phe Ile Leu Met Ser Thr Asp Glu Glu Asn
1745 1750 1755

Lys Val Ser Gln Val Lys Ile Arg Phe Thr Asn Val Phe Lys Gly
1760 1765 1770

Asn Thr Ile Ser Asp Lys Ile Ser Phe Asn Phe Ser Asp Lys Gln
1775 1780 1785

Asp Val Ser Ile Asn Lys Val Ile Ser Thr Phe Thr Pro Ser Tyr
1790 1795 1800

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Tyr Val Glu Gly Leu Leu Asn Tyr Asp Leu Gly Leu Ile Ser Leu
1805 1810 1815

Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser
1820 1825 1830

Gly Leu Val Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro
1835 1840 1845

Ile Lys Asn Leu Ile Thr Gly Phe Thr Thr Ile Gly Asp Asp Lys
1850 1855 1860

Tyr Tyr Phe Asn Pro Asp Asn Gly Gly Ala Ala Ser Val Gly Glu
1865 1870 1875

Thr Ile Ile Asp Gly Lys Asn Tyr Tyr Phe Ser Gln Asn Gly Val
1880 1885 1890

Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
1895 1900 1905

Ala Pro Ala Asp Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile
1910 1915 1920

Asp Phe Thr Gly Lys Leu Thr Ile Asp Glu Asn Val Tyr Tyr Phe
1925 1930 1935

Gly Asp Asn Tyr Arg Ala Ala Ile Glu Trp Gln Thr Leu Asp Asp
1940 1945 1950

Glu Val Tyr Tyr Phe Ser Thr Asp Thr Gly Arg Ala Phe Lys Gly
1955 1960 1965

Leu Asn Gln Ile Gly Asp Asp Lys Phe Tyr Phe Asn Ser Asp Gly
1970 1975 1980

Ile Met Gln Lys Gly Phe Val Asn Ile Asn Asp Lys Thr Phe Tyr
1985 1990 1995

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Phe Asp Asp Ser Gly Val Met Lys Ser Gly Tyr Thr Glu Ile Asp
2000 2005 2010

Gly Lys Tyr Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly
2015 2020 2025

Val Phe Asn Thr Ala Asp Gly Phe Lys Tyr Phe Ala His His Asp
2030 2035 2040

Glu Asp Leu Gly Asn Glu Glu Gly Glu Ala Leu Ser Tyr Ser Gly
2045 2050 2055

Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe
2060 2065 2070

Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr
2075 2080 2085

Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Ile Ser Ile
2090 2095 2100

Ile Asn Asp Gly Lys Tyr Tyr Phe Asn Asp Ser Gly Ile Met Gln
2105 2110 2115

Ile Gly Phe Val Thr Ile Asn Asn Glu Val Phe Tyr Phe Ser Asp
2120 2125 2130

Ser Gly Ile Val Glu Ser Gly Met Gln Asn Ile Asp Asp Asn Tyr
2135 2140 2145

Phe Tyr Ile Asp Glu Asn Gly Leu Val Gln Ile Gly Val Phe Asp
2150 2155 2160

Thr Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn
2165 2170 2175

Asp Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg
2180 2185 2190

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Val Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu
2195 2200 2205

Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr
2210 2215 2220

Phe Asp Pro Glu Thr Lys Lys Ala Tyr Lys Gly Ile Asn Val Ile
2225 2230 2235

Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Asn Gly Ile Met Arg Thr
2240 2245 2250

Gly Leu Ile Thr Phe Glu Asp Asn His Tyr Tyr Phe Asn Glu Asp
2255 2260 2265

Gly Ile Met Gln Tyr Gly Tyr Leu Asn Ile Glu Asp Lys Thr Phe
2270 2275 2280

Tyr Phe Ser Glu Asp Gly Ile Met Gln Ile Gly Val Phe Asn Thr
2285 2290 2295

Pro Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu
2300 2305 2310

Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu
2315 2320 2325

Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr
2330 2335 2340

Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp
2345 2350 2355

Thr Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 134
<211> 2710

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<212> PRT
<213> Clostridium difficile

<400> 134

Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1 5 10 15

Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
20 25 30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
35 40 45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr
50 55 60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65 70 75 80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
100 105 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
115 120 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
130 135 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145 150 155 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
165 170 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
180 185 190

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```
Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
    290                 295                 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
                325                 330                 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
            340                 345                 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
        355                 360                 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
    370                 375                 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385                 390                 395                 400
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Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
                405                 410                 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
            420                 425                 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
        435                 440                 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
    450                 455                 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465                 470                 475                 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
                485                 490                 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
            500                 505                 510

Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
        515                 520                 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
    530                 535                 540

Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545                 550                 555                 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
                565                 570                 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
            580                 585                 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
        595                 600                 605
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Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
610 615 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625 630 635 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
645 650 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
660 665 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
675 680 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
690 695 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705 710 715 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser
725 730 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
740 745 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
755 760 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
770 775 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785 790 795 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
805 810 815

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```
Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
            820                 825                 830

Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
        835                 840                 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
    850                 855                 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865                 870                 875                 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
                885                 890                 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
            900                 905                 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
        915                 920                 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
    930                 935                 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945                 950                 955                 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
                965                 970                 975

Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
            980                 985                 990

Ala Gln Leu Phe Ser Thr Gly Leu  Asn Thr Ile Tyr Asp  Ser Ile Gln
        995                 1000                1005

Leu Val  Asn Leu Ile Ser Asn  Ala Val Asn Asp Thr  Ile Asn Val
    1010                1015                1020
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Leu Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu
1025 1030 1035

Asp Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu
1040 1045 1050

His Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val
1055 1060 1065

Leu Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser
1070 1075 1080

Ile Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile
1085 1090 1095

Ala Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu
1100 1105 1110

Ile Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His
1115 1120 1125

Leu Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp
1130 1135 1140

Lys Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp
1145 1150 1155

Phe Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala
1160 1165 1170

Met Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His
1175 1180 1185

Phe Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser
1190 1195 1200

Ile Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser
1205 1210 1215

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Lys Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp
1220 1225 1230

Trp Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp
1235 1240 1245

Gly Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys
1250 1255 1260

Phe Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr
1265 1270 1275

Leu Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp
1280 1285 1290

Lys Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu
1295 1300 1305

Ile Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr
1310 1315 1320

Tyr Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn
1325 1330 1335

Leu Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val
1340 1345 1350

Arg Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu
1355 1360 1365

Ile Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu
1370 1375 1380

Ile Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn
1385 1390 1395

Lys Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile
1400 1405 1410

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Ser Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu
1415 1420 1425

Leu Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn
1430 1435 1440

Thr Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile
1445 1450 1455

Ala Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala
1460 1465 1470

Ile Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp
1475 1480 1485

Ser Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe
1490 1495 1500

Asn Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys
1505 1510 1515

Asp Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn
1520 1525 1530

Thr Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn
1535 1540 1545

Gln Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser
1550 1555 1560

Ser Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr
1565 1570 1575

Ser Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys
1580 1585 1590

Leu Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe
1595 1600 1605

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Thr Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys
1610 1615 1620

Asp Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr
1625 1630 1635

Ser Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val
1640 1645 1650

Val Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser
1655 1660 1665

Thr Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg
1670 1675 1680

Tyr Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu
1685 1690 1695

Ile Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu
1700 1705 1710

Ile Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile
1715 1720 1725

Asn Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly
1730 1735 1740

Ser Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys
1745 1750 1755

Ile Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln
1760 1765 1770

Ser Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu
1775 1780 1785

Ser Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu
1790 1795 1800

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Asn Glu  Leu Asp Arg Asp His  Leu Gly Phe Lys Ile  Ile Asp Asn
    1805                 1810                 1815

Lys Thr  Tyr Tyr Tyr Asp Glu  Asp Ser Lys Leu Val  Lys Gly Leu
    1820                 1825                 1830

Ile Asn  Ile Asn Asn Ser Leu  Phe Tyr Phe Asp Pro  Ile Glu Phe
    1835                 1840                 1845

Asn Leu  Val Thr Gly Trp Gln  Thr Ile Asn Gly Lys  Lys Tyr Tyr
    1850                 1855                 1860

Phe Asp  Ile Asn Thr Gly Ala  Ala Leu Thr Ser Tyr  Lys Ile Ile
    1865                 1870                 1875

Asn Gly  Lys His Phe Tyr Phe  Asn Asn Asp Gly Val  Met Gln Leu
    1880                 1885                 1890

Gly Val  Phe Lys Gly Pro Asp  Gly Phe Glu Tyr Phe  Ala Pro Ala
    1895                 1900                 1905

Asn Thr  Gln Asn Asn Asn Ile  Glu Gly Gln Ala Ile  Val Tyr Gln
    1910                 1915                 1920

Ser Lys  Phe Leu Thr Leu Asn  Gly Lys Lys Tyr Tyr  Phe Asp Asn
    1925                 1930                 1935

Asp Ser  Lys Ala Val Thr Gly  Trp Arg Ile Ile Asn  Asn Glu Lys
    1940                 1945                 1950

Tyr Tyr  Phe Asn Pro Asn Asn  Ala Ile Ala Ala Val  Gly Leu Gln
    1955                 1960                 1965

Val Ile  Asp Asn Asn Lys Tyr  Tyr Phe Asn Pro Asp  Thr Ala Ile
    1970                 1975                 1980

Ile Ser  Lys Gly Trp Gln Thr  Val Asn Gly Ser Arg  Tyr Tyr Phe
    1985                 1990                 1995
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Asp Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp
2000 2005 2010

Gly Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly
2015 2020 2025

Val Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2030 2035 2040

Thr Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
2045 2050 2055

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
2060 2065 2070

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr
2075 2080 2085

Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr
2090 2095 2100

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala
2105 2110 2115

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2120 2125 2130

Thr Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
2135 2140 2145

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2150 2155 2160

Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2165 2170 2175

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu
2180 2185 2190

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Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser
2195 2200 2205

Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile
2225 2230 2235

Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn
2240 2245 2250

Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn
2255 2260 2265

Asn Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly
2270 2275 2280

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu
2285 2290 2295

Gly Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly
2300 2305 2310

Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp
2315 2320 2325

Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala
2330 2335 2340

Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr
2345 2350 2355

Phe Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2360 2365 2370

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser
2375 2380 2385

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```
Thr Gly  Tyr Thr Ser Ile Asn  Gly Lys His Phe Tyr  Phe Asn Thr
    2390                 2395                 2400

Asp Gly  Ile Met Gln Ile Gly  Val Phe Lys Gly Pro  Asn Gly Phe
    2405                 2410                 2415

Glu Tyr  Phe Ala Pro Ala Asn  Thr His Asn Asn Asn  Ile Glu Gly
    2420                 2425                 2430

Gln Ala  Ile Leu Tyr Gln Asn  Lys Phe Leu Thr Leu  Asn Gly Lys
    2435                 2440                 2445

Lys Tyr  Tyr Phe Gly Ser Asp  Ser Lys Ala Val Thr  Gly Leu Arg
    2450                 2455                 2460

Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn Thr Asn  Thr Ala Val
    2465                 2470                 2475

Ala Val  Thr Gly Trp Gln Thr  Ile Asn Gly Lys Lys  Tyr Tyr Phe
    2480                 2485                 2490

Asn Thr  Asn Thr Ser Ile Ala  Ser Thr Gly Tyr Thr  Ile Ile Ser
    2495                 2500                 2505

Gly Lys  His Phe Tyr Phe Asn  Thr Asp Gly Ile Met  Gln Ile Gly
    2510                 2515                 2520

Val Phe  Lys Gly Pro Asp Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2525                 2530                 2535

Thr Asp  Ala Asn Asn Ile Glu  Gly Gln Ala Ile Arg  Tyr Gln Asn
    2540                 2545                 2550

Arg Phe  Leu Tyr Leu His Asp  Asn Ile Tyr Tyr Phe  Gly Asn Asn
    2555                 2560                 2565

Ser Lys  Ala Ala Thr Gly Trp  Val Thr Ile Asp Gly  Asn Arg Tyr
    2570                 2575                 2580
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Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr
2585 2590 2595

Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile
2600 2605 2610

Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala
2615 2620 2625

Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln
2630 2635 2640

Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly
2705 2710

<210> 135
<211> 2710
<212> PRT
<213> Clostridium difficile

<400> 135

Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1 5 10 15

Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
20 25 30

```
Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
        35                  40                  45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr
    50                  55                  60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65                  70                  75                  80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
            100                 105                 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
        115                 120                 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
    130                 135                 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240
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```
Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
    290                 295                 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
                325                 330                 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
            340                 345                 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
        355                 360                 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
    370                 375                 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385                 390                 395                 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
                405                 410                 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
            420                 425                 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
        435                 440                 445
```

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```
Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
    450                 455                 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465                 470                 475                 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
                485                 490                 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
            500                 505                 510

Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
        515                 520                 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
    530                 535                 540

Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545                 550                 555                 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
                565                 570                 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
            580                 585                 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
        595                 600                 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
    610                 615                 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625                 630                 635                 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
                645                 650                 655
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```
Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
            660                 665                 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
        675                 680                 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
    690                 695                 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705                 710                 715                 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser
                725                 730                 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
            740                 745                 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
        755                 760                 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
    770                 775                 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785                 790                 795                 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
                805                 810                 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
            820                 825                 830

Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
        835                 840                 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
    850                 855                 860
```

```
Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865                 870                 875                 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
                885                 890                 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
            900                 905                 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
        915                 920                 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
    930                 935                 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945                 950                 955                 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
                965                 970                 975

Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
            980                 985                 990

Ala Gln Leu Phe Ser Thr Gly Leu  Asn Thr Ile Tyr Asp  Ser Ile Gln
        995                 1000                1005

Leu Val  Asn Leu Ile Ser Asn  Ala Val Asn Asp Thr  Ile Asn Val
    1010                1015                1020

Leu Pro  Thr Ile Thr Glu Gly  Ile Pro Ile Val Ser  Thr Ile Leu
    1025                1030                1035

Asp Gly  Ile Asn Leu Gly Ala  Ala Ile Lys Glu Leu  Leu Asp Glu
    1040                1045                1050

His Asp  Pro Leu Leu Lys Lys  Glu Leu Glu Ala Lys  Val Gly Val
    1055                1060                1065
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Leu Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser
1070 1075 1080

Ile Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile
1085 1090 1095

Ala Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu
1100 1105 1110

Ile Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His
1115 1120 1125

Leu Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp
1130 1135 1140

Lys Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp
1145 1150 1155

Phe Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala
1160 1165 1170

Met Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His
1175 1180 1185

Phe Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser
1190 1195 1200

Ile Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser
1205 1210 1215

Lys Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp
1220 1225 1230

Trp Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp
1235 1240 1245

Gly Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys
1250 1255 1260

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```
Phe Tyr  Trp Arg Phe Tyr Ala  Phe Phe Asp Tyr Ala  Ile Thr Thr
    1265                1270                1275

Leu Lys  Pro Val Tyr Glu Asp  Thr Asn Ile Lys Ile  Lys Leu Asp
    1280                1285                1290

Lys Asp  Thr Arg Asn Phe Ile  Met Pro Thr Ile Thr  Thr Asn Glu
    1295                1300                1305

Ile Arg  Asn Lys Leu Ser Tyr  Ser Phe Asp Gly Ala  Gly Gly Thr
    1310                1315                1320

Tyr Ser  Leu Leu Leu Ser Ser  Tyr Pro Ile Ser Thr  Asn Ile Asn
    1325                1330                1335

Leu Ser  Lys Asp Asp Leu Trp  Ile Phe Asn Ile Asp  Asn Glu Val
    1340                1345                1350

Arg Glu  Ile Ser Ile Glu Asn  Gly Thr Ile Lys Lys  Gly Lys Leu
    1355                1360                1365

Ile Lys  Asp Val Leu Ser Lys  Ile Asp Ile Asn Lys  Asn Lys Leu
    1370                1375                1380

Ile Ile  Gly Asn Gln Thr Ile  Asp Phe Ser Gly Asp  Ile Asp Asn
    1385                1390                1395

Lys Asp  Arg Tyr Ile Phe Leu  Thr Cys Glu Leu Asp  Asp Lys Ile
    1400                1405                1410

Ser Leu  Ile Ile Glu Ile Asn  Leu Val Ala Lys Ser  Tyr Ser Leu
    1415                1420                1425

Leu Leu  Ser Gly Asp Lys Asn  Tyr Leu Ile Ser Asn  Leu Ser Asn
    1430                1435                1440

Thr Ile  Glu Lys Ile Asn Thr  Leu Gly Leu Asp Ser  Lys Asn Ile
    1445                1450                1455
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Ala Tyr  Asn Tyr Thr Asp Glu  Ser Asn Asn Lys Tyr  Phe Gly Ala
    1460                1465                1470

Ile Ser  Lys Thr Ser Gln Lys  Ser Ile Ile His Tyr  Lys Lys Asp
    1475                1480                1485

Ser Lys  Asn Ile Leu Glu Phe  Tyr Asn Asp Ser Thr  Leu Glu Phe
    1490                1495                1500

Asn Ser  Lys Asp Phe Ile Ala  Glu Asp Ile Asn Val  Phe Met Lys
    1505                1510                1515

Asp Asp  Ile Asn Thr Ile Thr  Gly Lys Tyr Tyr Val  Asp Asn Asn
    1520                1525                1530

Thr Asp  Lys Ser Ile Asp Phe  Ser Ile Ser Leu Val  Ser Lys Asn
    1535                1540                1545

Gln Val  Lys Val Asn Gly Leu  Tyr Leu Asn Glu Ser  Val Tyr Ser
    1550                1555                1560

Ser Tyr  Leu Asp Phe Val Lys  Asn Ser Asp Gly His  His Asn Thr
    1565                1570                1575

Ser Asn  Phe Met Asn Leu Phe  Leu Asp Asn Ile Ser  Phe Trp Lys
    1580                1585                1590

Leu Phe  Gly Phe Glu Asn Ile  Asn Phe Val Ile Asp  Lys Tyr Phe
    1595                1600                1605

Thr Leu  Val Gly Lys Thr Asn  Leu Gly Tyr Val Glu  Phe Ile Cys
    1610                1615                1620

Asp Asn  Asn Lys Asn Ile Asp  Ile Tyr Phe Gly Glu  Trp Lys Thr
    1625                1630                1635

Ser Ser  Ser Lys Ser Thr Ile  Phe Ser Gly Asn Gly  Arg Asn Val
    1640                1645                1650
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Val Val  Glu Pro Ile Tyr Asn  Pro Asp Thr Gly Glu  Asp Ile Ser
    1655                1660                1665

Thr Ser  Leu Asp Phe Ser Tyr  Glu Pro Leu Tyr Gly  Ile Asp Arg
    1670                1675                1680

Tyr Ile  Asn Lys Val Leu Ile  Ala Pro Asp Leu Tyr  Thr Ser Leu
    1685                1690                1695

Ile Asn  Ile Asn Thr Asn Tyr  Tyr Ser Asn Glu Tyr  Tyr Pro Glu
    1700                1705                1710

Ile Ile  Val Leu Asn Pro Asn  Thr Phe His Lys Lys  Val Asn Ile
    1715                1720                1725

Asn Leu  Asp Ser Ser Ser Phe  Glu Tyr Lys Trp Ser  Thr Glu Gly
    1730                1735                1740

Ser Asp  Phe Ile Leu Val Arg  Tyr Leu Glu Glu Ser  Asn Lys Lys
    1745                1750                1755

Ile Leu  Gln Lys Ile Arg Ile  Lys Gly Ile Leu Ser  Asn Thr Gln
    1760                1765                1770

Ser Phe  Asn Lys Met Ser Ile  Asp Phe Lys Asp Ile  Lys Lys Leu
    1775                1780                1785

Ser Leu  Gly Tyr Ile Met Ser  Asn Phe Lys Ser Phe  Asn Ser Glu
    1790                1795                1800

Asn Glu  Leu Asp Arg Asp His  Leu Gly Phe Lys Ile  Ile Asp Asn
    1805                1810                1815

Lys Thr  Tyr Tyr Tyr Asp Glu  Asp Ser Lys Leu Val  Lys Gly Leu
    1820                1825                1830

Ile Asn  Ile Asn Asn Ser Leu  Phe Tyr Phe Asp Pro  Ile Glu Phe
    1835                1840                1845
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Asn Leu  Val Thr Gly Trp Gln  Thr Ile Asn Gly Lys  Lys Tyr Tyr
    1850                1855                1860

Phe Asp  Ile Asn Thr Gly Ala  Ala Leu Thr Ser Tyr  Lys Ile Ile
    1865                1870                1875

Asn Gly  Lys His Phe Tyr Phe  Asn Asn Asp Gly Val  Met Gln Leu
    1880                1885                1890

Gly Val  Phe Lys Gly Pro Asp  Gly Phe Glu Tyr Phe  Ala Pro Ala
    1895                1900                1905

Asn Thr  Gln Asn Asn Asn Ile  Glu Gly Gln Ala Ile  Val Tyr Gln
    1910                1915                1920

Ser Lys  Phe Leu Thr Leu Asn  Gly Lys Lys Tyr Tyr  Phe Asp Asn
    1925                1930                1935

Asn Ser  Lys Ala Val Thr Gly  Trp Arg Ile Ile Asn  Asn Glu Lys
    1940                1945                1950

Tyr Tyr  Phe Asn Pro Asn Asn  Ala Ile Ala Ala Val  Gly Leu Gln
    1955                1960                1965

Val Ile  Asp Asn Asn Lys Tyr  Tyr Phe Asn Pro Asp  Thr Ala Ile
    1970                1975                1980

Ile Ser  Lys Gly Trp Gln Thr  Val Asn Gly Ser Arg  Tyr Tyr Phe
    1985                1990                1995

Asp Thr  Asp Thr Ala Ile Ala  Phe Asn Gly Tyr Lys  Thr Ile Asp
    2000                2005                2010

Gly Lys  His Phe Tyr Phe Asp  Ser Asp Cys Val Val  Lys Ile Gly
    2015                2020                2025

Val Phe  Ser Thr Ser Asn Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2030                2035                2040
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Thr Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
2045 2050 2055

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
2060 2065 2070

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr
2075 2080 2085

Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr
2090 2095 2100

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala
2105 2110 2115

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2120 2125 2130

Thr Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
2135 2140 2145

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2150 2155 2160

Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2165 2170 2175

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu
2180 2185 2190

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser
2195 2200 2205

Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile
2225 2230 2235

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Asn Asn  Asp Lys Tyr Tyr Phe  Ser Tyr Asp Gly Ile  Leu Gln Asn
    2240                2245                2250

Gly Tyr  Ile Thr Ile Glu Arg  Asn Asn Phe Tyr Phe  Asp Ala Asn
    2255                2260                2265

Asn Glu  Ser Lys Met Val Thr  Gly Val Phe Lys Gly  Pro Asn Gly
    2270                2275                2280

Phe Glu  Tyr Phe Ala Pro Ala  Asn Thr His Asn Asn  Asn Ile Glu
    2285                2290                2295

Gly Gln  Ala Ile Val Tyr Gln  Asn Lys Phe Leu Thr  Leu Asn Gly
    2300                2305                2310

Lys Lys  Tyr Tyr Phe Asp Asn  Asp Ser Lys Ala Val  Thr Gly Trp
    2315                2320                2325

Gln Thr  Ile Asp Gly Lys Lys  Tyr Tyr Phe Asn Leu  Asn Thr Ala
    2330                2335                2340

Glu Ala  Ala Thr Gly Trp Gln  Thr Ile Asp Gly Lys  Lys Tyr Tyr
    2345                2350                2355

Phe Asn  Leu Asn Thr Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile
    2360                2365                2370

Asp Gly  Lys Lys Tyr Tyr Phe  Asn Thr Asn Thr Phe  Ile Ala Ser
    2375                2380                2385

Thr Gly  Tyr Thr Ser Ile Asn  Gly Lys His Phe Tyr  Phe Asn Thr
    2390                2395                2400

Asp Gly  Ile Met Gln Ile Gly  Val Phe Lys Gly Pro  Asn Gly Phe
    2405                2410                2415

Glu Tyr  Phe Ala Pro Ala Asn  Thr Asp Ala Asn Asn  Ile Glu Gly
    2420                2425                2430
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Gln Ala  Ile Leu Tyr Gln Asn  Lys Phe Leu Thr Leu  Asn Gly Lys
    2435                 2440                 2445

Lys Tyr  Tyr Phe Gly Ser Asp  Ser Lys Ala Val Thr  Gly Leu Arg
    2450                 2455                 2460

Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn Thr Asn  Thr Ala Val
    2465                 2470                 2475

Ala Val  Thr Gly Trp Gln Thr  Ile Asn Gly Lys Lys  Tyr Tyr Phe
    2480                 2485                 2490

Asn Thr  Asn Thr Ser Ile Ala  Ser Thr Gly Tyr Thr  Ile Ile Ser
    2495                 2500                 2505

Gly Lys  His Phe Tyr Phe Asn  Thr Asp Gly Ile Met  Gln Ile Gly
    2510                 2515                 2520

Val Phe  Lys Gly Pro Asp Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2525                 2530                 2535

Thr Asp  Ala Asn Asn Ile Glu  Gly Gln Ala Ile Arg  Tyr Gln Asn
    2540                 2545                 2550

Arg Phe  Leu Tyr Leu His Asp  Asn Ile Tyr Tyr Phe  Gly Asn Asn
    2555                 2560                 2565

Ser Lys  Ala Ala Thr Gly Trp  Val Thr Ile Asp Gly  Asn Arg Tyr
    2570                 2575                 2580

Tyr Phe  Glu Pro Asn Thr Ala  Met Gly Ala Asn Gly  Tyr Lys Thr
    2585                 2590                 2595

Ile Asp  Asn Lys Asn Phe Tyr  Phe Arg Asn Gly Leu  Pro Gln Ile
    2600                 2605                 2610

Gly Val  Phe Lys Gly Ser Asn  Gly Phe Glu Tyr Phe  Ala Pro Ala
    2615                 2620                 2625
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Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln
2630 2635 2640

Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly
2705 2710

<210> 136
<211> 2710
<212> PRT
<213> Clostridium difficile

<400> 136

Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1 5 10 15

Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
20 25 30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
35 40 45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr
50 55 60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65 70 75 80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn

85 90 95

Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
100 105 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
115 120 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
130 135 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145 150 155 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
165 170 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
180 185 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
195 200 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg
210 215 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225 230 235 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
245 250 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
260 265 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
275 280 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser

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290 295 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
325 330 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
340 345 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
355 360 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
370 375 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385 390 395 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
405 410 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
420 425 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
435 440 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
450 455 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465 470 475 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
485 490 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu

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            500                 505                 510

Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
        515                 520                 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
    530                 535                 540

Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545                 550                 555                 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
                565                 570                 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
            580                 585                 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
        595                 600                 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
    610                 615                 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625                 630                 635                 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
                645                 650                 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
            660                 665                 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
        675                 680                 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
    690                 695                 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
```

705 710 715 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser
725 730 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
740 745 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
755 760 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
770 775 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785 790 795 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
805 810 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
820 825 830

Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
835 840 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
850 855 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865 870 875 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
885 890 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
900 905 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr

915 920 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
930 935 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945 950 955 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
965 970 975

Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
980 985 990

Ala Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln
995 1000 1005

Leu Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val
1010 1015 1020

Leu Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu
1025 1030 1035

Asp Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu
1040 1045 1050

His Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val
1055 1060 1065

Leu Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser
1070 1075 1080

Ile Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile
1085 1090 1095

Ala Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu
1100 1105 1110

Ile Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His

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1115 1120 1125

Leu Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp
1130 1135 1140

Lys Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp
1145 1150 1155

Phe Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala
1160 1165 1170

Met Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His
1175 1180 1185

Phe Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser
1190 1195 1200

Ile Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser
1205 1210 1215

Lys Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp
1220 1225 1230

Trp Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp
1235 1240 1245

Gly Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys
1250 1255 1260

Phe Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr
1265 1270 1275

Leu Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp
1280 1285 1290

Lys Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu
1295 1300 1305

Ile Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr

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1310 1315 1320

Tyr Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn
1325 1330 1335

Leu Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val
1340 1345 1350

Arg Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu
1355 1360 1365

Ile Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu
1370 1375 1380

Ile Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn
1385 1390 1395

Lys Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile
1400 1405 1410

Ser Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu
1415 1420 1425

Leu Leu Ser Gly Asn Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn
1430 1435 1440

Thr Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile
1445 1450 1455

Ala Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala
1460 1465 1470

Ile Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp
1475 1480 1485

Ser Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe
1490 1495 1500

Asn Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys

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1505 1510 1515

Asp Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn
1520 1525 1530

Thr Asp Lys Gly Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn
1535 1540 1545

Gln Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser
1550 1555 1560

Ser Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr
1565 1570 1575

Ser Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys
1580 1585 1590

Leu Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe
1595 1600 1605

Thr Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys
1610 1615 1620

Asp Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr
1625 1630 1635

Ser Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val
1640 1645 1650

Val Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser
1655 1660 1665

Thr Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg
1670 1675 1680

Tyr Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu
1685 1690 1695

Ile Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu

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1700 1705 1710

Ile Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile
1715 1720 1725

Asn Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly
1730 1735 1740

Ser Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys
1745 1750 1755

Ile Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln
1760 1765 1770

Ser Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu
1775 1780 1785

Ser Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu
1790 1795 1800

Asn Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn
1805 1810 1815

Lys Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu
1820 1825 1830

Ile Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe
1835 1840 1845

Asn Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr
1850 1855 1860

Phe Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile
1865 1870 1875

Asn Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu
1880 1885 1890

Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala

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1895 1900 1905

Asn Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln
1910 1915 1920

Ser Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn
1925 1930 1935

Asp Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys
1940 1945 1950

Tyr Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln
1955 1960 1965

Val Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile
1970 1975 1980

Ile Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe
1985 1990 1995

Asp Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp
2000 2005 2010

Gly Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly
2015 2020 2025

Val Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2030 2035 2040

Thr Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
2045 2050 2055

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asp Asn
2060 2065 2070

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr
2075 2080 2085

Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr

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2090 2095 2100

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala
2105 2110 2115

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2120 2125 2130

Thr Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
2135 2140 2145

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2150 2155 2160

Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2165 2170 2175

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu
2180 2185 2190

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser
2195 2200 2205

Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile
2225 2230 2235

Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn
2240 2245 2250

Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn
2255 2260 2265

Asn Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly
2270 2275 2280

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu

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2285 2290 2295

Gly Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly
2300 2305 2310

Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp
2315 2320 2325

Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala
2330 2335 2340

Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr
2345 2350 2355

Phe Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2360 2365 2370

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser
2375 2380 2385

Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr
2390 2395 2400

Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe
2405 2410 2415

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2420 2425 2430

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2435 2440 2445

Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg
2450 2455 2460

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val
2465 2470 2475

Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe

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2480 2485 2490

Asn Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser
2495 2500 2505

Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly
2510 2515 2520

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2525 2530 2535

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2540 2545 2550

Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn
2555 2560 2565

Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr
2570 2575 2580

Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr
2585 2590 2595

Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile
2600 2605 2610

Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala
2615 2620 2625

Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln
2630 2635 2640

Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu

2675 2680 2685

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly
2705 2710

<210> 137
<211> 2710
<212> PRT
<213> Clostridium difficile

<400> 137

Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1 5 10 15

Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
20 25 30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
35 40 45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr
50 55 60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65 70 75 80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
100 105 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
115 120 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
130 135 140

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Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
    290                 295                 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
                325                 330                 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
            340                 345                 350
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Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
        355                 360                 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
    370                 375                 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385                 390                 395                 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
                405                 410                 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
            420                 425                 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
        435                 440                 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
    450                 455                 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465                 470                 475                 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
                485                 490                 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
            500                 505                 510

Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
        515                 520                 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
    530                 535                 540

Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545                 550                 555                 560
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Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
565 570 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
580 585 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
595 600 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
610 615 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625 630 635 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
645 650 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
660 665 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
675 680 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
690 695 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705 710 715 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser
725 730 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
740 745 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
755 760 765

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```
Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
    770                 775                 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785                 790                 795                 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
                805                 810                 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
            820                 825                 830

Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
        835                 840                 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
    850                 855                 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865                 870                 875                 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
                885                 890                 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
            900                 905                 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
        915                 920                 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
    930                 935                 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945                 950                 955                 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
                965                 970                 975
```

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Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
980 985 990

Ala Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln
995 1000 1005

Leu Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val
1010 1015 1020

Leu Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu
1025 1030 1035

Asp Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu
1040 1045 1050

His Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val
1055 1060 1065

Leu Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser
1070 1075 1080

Ile Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile
1085 1090 1095

Ala Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu
1100 1105 1110

Ile Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His
1115 1120 1125

Leu Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp
1130 1135 1140

Lys Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp
1145 1150 1155

Phe Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala
1160 1165 1170

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```
Met Glu  Gly Gly Ser Gly His  Thr Val Thr Gly Asn  Ile Asp His
    1175                 1180                 1185

Phe Phe  Ser Ser Pro Ser Ile  Ser Ser His Ile Pro  Ser Leu Ser
    1190                 1195                 1200

Ile Tyr  Ser Ala Ile Gly Ile  Glu Thr Glu Asn Leu  Asp Phe Ser
    1205                 1210                 1215

Lys Lys  Ile Met Met Leu Pro  Asn Ala Pro Ser Arg  Val Phe Trp
    1220                 1225                 1230

Trp Glu  Thr Gly Ala Val Pro  Gly Leu Arg Ser Leu  Glu Asn Asp
    1235                 1240                 1245

Gly Thr  Arg Leu Leu Asp Ser  Ile Arg Asp Leu Tyr  Pro Gly Lys
    1250                 1255                 1260

Phe Tyr  Trp Arg Phe Tyr Ala  Phe Phe Asp Tyr Ala  Ile Thr Thr
    1265                 1270                 1275

Leu Lys  Pro Val Tyr Glu Asp  Thr Asn Ile Lys Ile  Lys Leu Asp
    1280                 1285                 1290

Lys Asp  Thr Arg Asn Phe Ile  Met Pro Thr Ile Thr  Thr Asn Glu
    1295                 1300                 1305

Ile Arg  Asn Lys Leu Ser Tyr  Ser Phe Asp Gly Ala  Gly Gly Thr
    1310                 1315                 1320

Tyr Ser  Leu Leu Leu Ser Ser  Tyr Pro Ile Ser Thr  Asn Ile Asn
    1325                 1330                 1335

Leu Ser  Lys Asp Asp Leu Trp  Ile Phe Asn Ile Asp  Asn Glu Val
    1340                 1345                 1350

Arg Glu  Ile Ser Ile Glu Asn  Gly Thr Ile Lys Lys  Gly Lys Leu
    1355                 1360                 1365
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Ile Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu
1370 1375 1380

Ile Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn
1385 1390 1395

Lys Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile
1400 1405 1410

Ser Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu
1415 1420 1425

Leu Leu Ser Gly Asn Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn
1430 1435 1440

Thr Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile
1445 1450 1455

Ala Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala
1460 1465 1470

Ile Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp
1475 1480 1485

Ser Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe
1490 1495 1500

Asn Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys
1505 1510 1515

Asp Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn
1520 1525 1530

Thr Asp Lys Gly Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn
1535 1540 1545

Gln Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser
1550 1555 1560

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```
Ser Tyr  Leu Asp Phe Val Lys  Asn Ser Asp Gly His  His Asn Thr
    1565                1570                1575

Ser Asn  Phe Met Asn Leu Phe  Leu Asp Asn Ile Ser  Phe Trp Lys
    1580                1585                1590

Leu Phe  Gly Phe Glu Asn Ile  Asn Phe Val Ile Asp  Lys Tyr Phe
    1595                1600                1605

Thr Leu  Val Gly Lys Thr Asn  Leu Gly Tyr Val Glu  Phe Ile Cys
    1610                1615                1620

Asp Asn  Asn Lys Asn Ile Asp  Ile Tyr Phe Gly Glu  Trp Lys Thr
    1625                1630                1635

Ser Ser  Ser Lys Ser Thr Ile  Phe Ser Gly Asn Gly  Arg Asn Val
    1640                1645                1650

Val Val  Glu Pro Ile Tyr Asn  Pro Asp Thr Gly Glu  Asp Ile Ser
    1655                1660                1665

Thr Ser  Leu Asp Phe Ser Tyr  Glu Pro Leu Tyr Gly  Ile Asp Arg
    1670                1675                1680

Tyr Ile  Asn Lys Val Leu Ile  Ala Pro Asp Leu Tyr  Thr Ser Leu
    1685                1690                1695

Ile Asn  Ile Asn Thr Asn Tyr  Tyr Ser Asn Glu Tyr  Tyr Pro Glu
    1700                1705                1710

Ile Ile  Val Leu Asn Pro Asn  Thr Phe His Lys Lys  Val Asn Ile
    1715                1720                1725

Asn Leu  Asp Ser Ser Ser Phe  Glu Tyr Lys Trp Ser  Thr Glu Gly
    1730                1735                1740

Ser Asp  Phe Ile Leu Val Arg  Tyr Leu Glu Glu Ser  Asn Lys Lys
    1745                1750                1755
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Ile Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln
1760 1765 1770

Ser Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu
1775 1780 1785

Ser Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu
1790 1795 1800

Asn Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn
1805 1810 1815

Lys Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu
1820 1825 1830

Ile Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe
1835 1840 1845

Asn Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr
1850 1855 1860

Phe Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile
1865 1870 1875

Asn Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu
1880 1885 1890

Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala
1895 1900 1905

Asn Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln
1910 1915 1920

Ser Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn
1925 1930 1935

Asp Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys
1940 1945 1950

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```
Tyr Tyr  Phe Asn Pro Asn Asn  Ala Ile Ala Ala Val  Gly Leu Gln
    1955                1960                1965

Val Ile  Asp Asn Asn Lys Tyr  Tyr Phe Asn Pro Asp  Thr Ala Ile
    1970                1975                1980

Ile Ser  Lys Gly Trp Gln Thr  Val Asn Gly Ser Arg  Tyr Tyr Phe
    1985                1990                1995

Asp Thr  Asp Thr Ala Ile Ala  Phe Asn Gly Tyr Lys  Thr Ile Asp
    2000                2005                2010

Gly Lys  His Phe Tyr Phe Asp  Ser Asp Cys Val Val  Lys Ile Gly
    2015                2020                2025

Val Phe  Ser Thr Ser Asn Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2030                2035                2040

Thr Tyr  Asn Asn Asn Ile Glu  Gly Gln Ala Ile Val  Tyr Gln Ser
    2045                2050                2055

Lys Phe  Leu Thr Leu Asn Gly  Lys Lys Tyr Tyr Phe  Asp Asp Asn
    2060                2065                2070

Ser Lys  Ala Val Thr Gly Trp  Gln Thr Ile Asp Ser  Lys Lys Tyr
    2075                2080                2085

Tyr Phe  Asn Thr Asn Thr Ala  Glu Ala Ala Thr Gly  Trp Gln Thr
    2090                2095                2100

Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr Asn Thr  Ala Glu Ala
    2105                2110                2115

Ala Thr  Gly Trp Gln Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn
    2120                2125                2130

Thr Asn  Thr Ala Ile Ala Ser  Thr Gly Tyr Thr Ile  Ile Asn Gly
    2135                2140                2145
```

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```
Lys His  Phe Tyr Phe Asn Thr  Asp Gly Ile Met Gln  Ile Gly Val
    2150                2155                2160

Phe Lys  Gly Pro Asn Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr
    2165                2170                2175

Asp Ala  Asn Asn Ile Glu Gly  Gln Ala Ile Leu Tyr  Gln Asn Glu
    2180                2185                2190

Phe Leu  Thr Leu Asn Gly Lys  Lys Tyr Tyr Phe Gly  Ser Asp Ser
    2195                2200                2205

Lys Ala  Val Thr Gly Trp Arg  Ile Ile Asn Asn Lys  Lys Tyr Tyr
    2210                2215                2220

Phe Asn  Pro Asn Asn Ala Ile  Ala Ala Ile His Leu  Cys Thr Ile
    2225                2230                2235

Asn Asn  Asp Lys Tyr Tyr Phe  Ser Tyr Asp Gly Ile  Leu Gln Asn
    2240                2245                2250

Gly Tyr  Ile Thr Ile Glu Arg  Asn Asn Phe Tyr Phe  Asp Ala Asn
    2255                2260                2265

Asn Glu  Ser Lys Met Val Thr  Gly Val Phe Lys Gly  Pro Asn Gly
    2270                2275                2280

Phe Glu  Tyr Phe Ala Pro Ala  Asn Thr His Asn Asn  Asn Ile Glu
    2285                2290                2295

Gly Gln  Ala Ile Val Tyr Gln  Asn Lys Phe Leu Thr  Leu Asn Gly
    2300                2305                2310

Lys Lys  Tyr Tyr Phe Asp Asn  Asp Ser Lys Ala Val  Thr Gly Trp
    2315                2320                2325

Gln Thr  Ile Asp Gly Lys Lys  Tyr Tyr Phe Asn Leu  Asn Thr Ala
    2330                2335                2340
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```
Glu Ala  Ala Thr Gly Trp Gln  Thr Ile Asp Gly Lys  Lys Tyr Tyr
    2345                2350                2355

Phe Asn  Leu Asn Thr Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile
    2360                2365                2370

Asp Gly  Lys Lys Tyr Tyr Phe  Asn Thr Asn Thr Phe  Ile Ala Ser
    2375                2380                2385

Thr Gly  Tyr Thr Ser Ile Asn  Gly Lys His Phe Tyr  Phe Asn Thr
    2390                2395                2400

Asp Gly  Ile Met Gln Ile Gly  Val Phe Lys Gly Pro  Asn Gly Phe
    2405                2410                2415

Glu Tyr  Phe Ala Pro Ala Asn  Thr His Asn Asn Asn  Ile Glu Gly
    2420                2425                2430

Gln Ala  Ile Leu Tyr Gln Asn  Lys Phe Leu Thr Leu  Asn Gly Lys
    2435                2440                2445

Lys Tyr  Tyr Phe Gly Ser Asp  Ser Lys Ala Val Thr  Gly Leu Arg
    2450                2455                2460

Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn Thr Asn  Thr Ala Val
    2465                2470                2475

Ala Val  Thr Gly Trp Gln Thr  Ile Asn Gly Lys Lys  Tyr Tyr Phe
    2480                2485                2490

Asn Thr  Asn Thr Ser Ile Ala  Ser Thr Gly Tyr Thr  Ile Ile Ser
    2495                2500                2505

Gly Lys  His Phe Tyr Phe Asn  Thr Asp Gly Ile Met  Gln Ile Gly
    2510                2515                2520

Val Phe  Lys Gly Pro Asp Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2525                2530                2535
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Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2540 2545 2550

Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn
2555 2560 2565

Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr
2570 2575 2580

Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr
2585 2590 2595

Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile
2600 2605 2610

Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala
2615 2620 2625

Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln
2630 2635 2640

Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly
2705 2710

<210> 138
<211> 2710

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<212> PRT
<213> Clostridium difficile

<400> 138

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Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1               5                  10                  15

Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
            20                  25                  30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
        35                  40                  45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr
    50                  55                  60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65                  70                  75                  80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
            100                 105                 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
        115                 120                 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
    130                 135                 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
            180                 185                 190
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```
Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
    290                 295                 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
                325                 330                 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
            340                 345                 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
        355                 360                 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
    370                 375                 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385                 390                 395                 400
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Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
                405                 410                 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
            420                 425                 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
        435                 440                 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
    450                 455                 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465                 470                 475                 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
                485                 490                 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
            500                 505                 510

Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
        515                 520                 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
    530                 535                 540

Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545                 550                 555                 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
                565                 570                 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
            580                 585                 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
        595                 600                 605
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```
Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
    610                 615                 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625                 630                 635                 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
                645                 650                 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
            660                 665                 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
        675                 680                 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
    690                 695                 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705                 710                 715                 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser
                725                 730                 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
            740                 745                 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
        755                 760                 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
    770                 775                 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785                 790                 795                 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
                805                 810                 815
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```
Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
            820                 825                 830

Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
        835                 840                 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
    850                 855                 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865                 870                 875                 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
                885                 890                 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
            900                 905                 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
        915                 920                 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
    930                 935                 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945                 950                 955                 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
                965                 970                 975

Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
            980                 985                 990

Ala Gln Leu Phe Ser Thr Gly Leu  Asn Thr Ile Tyr Asp  Ser Ile Gln
        995                 1000                1005

Leu Val  Asn Leu Ile Ser Asn  Ala Val Asn Asp Thr  Ile Asn Val
    1010                1015                1020
```

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```
Leu Pro  Thr Ile Thr Glu Gly  Ile Pro Ile Val Ser  Thr Ile Leu
    1025                1030                1035

Asp Gly  Ile Asn Leu Gly Ala  Ala Ile Lys Glu Leu  Leu Asp Glu
    1040                1045                1050

His Asp  Pro Leu Leu Lys Lys  Glu Leu Glu Ala Lys  Val Gly Val
    1055                1060                1065

Leu Ala  Ile Asn Met Ser Leu  Ser Ile Ala Ala Thr  Val Ala Ser
    1070                1075                1080

Ile Val  Gly Ile Gly Ala Glu  Val Thr Ile Phe Leu  Leu Pro Ile
    1085                1090                1095

Ala Gly  Ile Ser Ala Gly Ile  Pro Ser Leu Val Asn  Asn Glu Leu
    1100                1105                1110

Ile Leu  His Asp Lys Ala Thr  Ser Val Val Asn Tyr  Phe Asn His
    1115                1120                1125

Leu Ser  Glu Ser Lys Lys Tyr  Gly Pro Leu Lys Thr  Glu Asp Asp
    1130                1135                1140

Lys Ile  Leu Val Pro Ile Asp  Asp Leu Val Ile Ser  Glu Ile Asp
    1145                1150                1155

Phe Asn  Asn Asn Ser Ile Lys  Leu Gly Thr Cys Asn  Ile Leu Ala
    1160                1165                1170

Met Glu  Gly Gly Ser Gly His  Thr Val Thr Gly Asn  Ile Asp His
    1175                1180                1185

Phe Phe  Ser Ser Pro Ser Ile  Ser Ser His Ile Pro  Ser Leu Ser
    1190                1195                1200

Ile Tyr  Ser Ala Ile Gly Ile  Glu Thr Glu Asn Leu  Asp Phe Ser
    1205                1210                1215
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Lys Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp
1220 1225 1230

Trp Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp
1235 1240 1245

Gly Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys
1250 1255 1260

Phe Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr
1265 1270 1275

Leu Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp
1280 1285 1290

Lys Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu
1295 1300 1305

Ile Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr
1310 1315 1320

Tyr Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn
1325 1330 1335

Leu Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val
1340 1345 1350

Arg Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu
1355 1360 1365

Ile Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu
1370 1375 1380

Ile Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn
1385 1390 1395

Lys Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile
1400 1405 1410

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Ser Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu
1415 1420 1425

Leu Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn
1430 1435 1440

Thr Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile
1445 1450 1455

Ala Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala
1460 1465 1470

Ile Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp
1475 1480 1485

Ser Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe
1490 1495 1500

Asn Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys
1505 1510 1515

Asp Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn
1520 1525 1530

Thr Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn
1535 1540 1545

Gln Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser
1550 1555 1560

Ser Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr
1565 1570 1575

Ser Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys
1580 1585 1590

Leu Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe
1595 1600 1605

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Thr Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys
1610 1615 1620

Asp Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr
1625 1630 1635

Ser Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val
1640 1645 1650

Val Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser
1655 1660 1665

Thr Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg
1670 1675 1680

Tyr Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu
1685 1690 1695

Ile Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu
1700 1705 1710

Ile Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile
1715 1720 1725

Asn Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly
1730 1735 1740

Ser Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys
1745 1750 1755

Ile Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln
1760 1765 1770

Ser Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu
1775 1780 1785

Ser Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu
1790 1795 1800

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```
Asn Glu  Leu Asp Arg Asp His  Leu Gly Phe Lys Ile  Ile Asp Asn
    1805                 1810                 1815

Lys Thr  Tyr Tyr Tyr Asp Glu  Asp Ser Lys Leu Val  Lys Gly Leu
    1820                 1825                 1830

Ile Asn  Ile Asn Asn Ser Leu  Phe Tyr Phe Asp Pro  Ile Glu Phe
    1835                 1840                 1845

Asn Leu  Val Thr Gly Trp Gln  Thr Ile Asn Gly Lys  Lys Tyr Tyr
    1850                 1855                 1860

Phe Asp  Ile Asn Thr Gly Ala  Ala Leu Thr Ser Tyr  Lys Ile Ile
    1865                 1870                 1875

Asn Gly  Lys His Phe Tyr Phe  Asn Asn Asp Gly Val  Met Gln Leu
    1880                 1885                 1890

Gly Val  Phe Lys Gly Pro Asp  Gly Phe Glu Tyr Phe  Ala Pro Ala
    1895                 1900                 1905

Asn Thr  Gln Asn Asn Asn Ile  Glu Gly Gln Ala Ile  Val Tyr Gln
    1910                 1915                 1920

Ser Lys  Phe Leu Thr Leu Asn  Gly Lys Lys Tyr Tyr  Phe Asp Asn
    1925                 1930                 1935

Asp Ser  Lys Ala Val Thr Gly  Trp Arg Ile Ile Asn  Asn Glu Lys
    1940                 1945                 1950

Tyr Tyr  Phe Asn Pro Asn Asn  Ala Ile Ala Ala Val  Gly Leu Gln
    1955                 1960                 1965

Val Ile  Asp Asn Asn Lys Tyr  Tyr Phe Asn Pro Asp  Thr Ala Ile
    1970                 1975                 1980

Ile Ser  Lys Gly Trp Gln Thr  Val Asn Gly Ser Arg  Tyr Tyr Phe
    1985                 1990                 1995
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Asp Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp
2000 2005 2010

Gly Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly
2015 2020 2025

Val Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2030 2035 2040

Thr Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
2045 2050 2055

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
2060 2065 2070

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr
2075 2080 2085

Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr
2090 2095 2100

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala
2105 2110 2115

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2120 2125 2130

Thr Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
2135 2140 2145

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2150 2155 2160

Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2165 2170 2175

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu
2180 2185 2190

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Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser
2195 2200 2205

Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile
2225 2230 2235

Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn
2240 2245 2250

Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn
2255 2260 2265

Asn Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly
2270 2275 2280

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu
2285 2290 2295

Gly Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly
2300 2305 2310

Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp
2315 2320 2325

Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala
2330 2335 2340

Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr
2345 2350 2355

Phe Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2360 2365 2370

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser
2375 2380 2385

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Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr
2390 2395 2400

Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe
2405 2410 2415

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2420 2425 2430

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2435 2440 2445

Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg
2450 2455 2460

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val
2465 2470 2475

Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
2480 2485 2490

Asn Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser
2495 2500 2505

Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly
2510 2515 2520

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2525 2530 2535

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2540 2545 2550

Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn
2555 2560 2565

Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr
2570 2575 2580

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Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr
2585 2590 2595

Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile
2600 2605 2610

Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala
2615 2620 2625

Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln
2630 2635 2640

Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly
2705 2710

<210> 139
<211> 2710
<212> PRT
<213> Clostridium difficile

<400> 139

Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1 5 10 15

Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
20 25 30

```
Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
        35                  40                  45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr
    50                  55                  60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65                  70                  75                  80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
            100                 105                 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
        115                 120                 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
    130                 135                 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240
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```
Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
    290                 295                 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
                325                 330                 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
            340                 345                 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
        355                 360                 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
    370                 375                 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385                 390                 395                 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
                405                 410                 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
            420                 425                 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
        435                 440                 445
```

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```
Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
    450                 455                 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465                 470                 475                 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
                485                 490                 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
            500                 505                 510

Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
        515                 520                 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
    530                 535                 540

Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545                 550                 555                 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
                565                 570                 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
            580                 585                 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
        595                 600                 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
    610                 615                 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625                 630                 635                 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
                645                 650                 655
```

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```
Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
            660                 665                 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
        675                 680                 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
    690                 695                 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705                 710                 715                 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser
                725                 730                 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
            740                 745                 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
        755                 760                 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
    770                 775                 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785                 790                 795                 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
                805                 810                 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
            820                 825                 830

Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
        835                 840                 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
    850                 855                 860
```

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```
Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865                 870                 875                 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
                885                 890                 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
            900                 905                 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
        915                 920                 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
    930                 935                 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945                 950                 955                 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
                965                 970                 975

Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
            980                 985                 990

Ala Gln Leu Phe Ser Thr Gly Leu  Asn Thr Ile Tyr Asp  Ser Ile Gln
        995                 1000                1005

Leu Val  Asn Leu Ile Ser Asn  Ala Val Asn Asp Thr  Ile Asn Val
    1010                1015                1020

Leu Pro  Thr Ile Thr Glu Gly  Ile Pro Ile Val Ser  Thr Ile Leu
    1025                1030                1035

Asp Gly  Ile Asn Leu Gly Ala  Ala Ile Lys Glu Leu  Leu Asp Glu
    1040                1045                1050

His Asp  Pro Leu Leu Lys Lys  Glu Leu Glu Ala Lys  Val Gly Val
    1055                1060                1065
```

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```
Leu Ala  Ile Asn Met Ser Leu  Ser Ile Ala Ala Thr  Val Ala Ser
    1070                1075                1080

Ile Val  Gly Ile Gly Ala Glu  Val Thr Ile Phe Leu  Leu Pro Ile
    1085                1090                1095

Ala Gly  Ile Ser Ala Gly Ile  Pro Ser Leu Val Asn  Asn Glu Leu
    1100                1105                1110

Ile Leu  His Asp Lys Ala Thr  Ser Val Val Asn Tyr  Phe Asn His
    1115                1120                1125

Leu Ser  Glu Ser Lys Lys Tyr  Gly Pro Leu Lys Thr  Glu Asp Asp
    1130                1135                1140

Lys Ile  Leu Val Pro Ile Asp  Asp Leu Val Ile Ser  Glu Ile Asp
    1145                1150                1155

Phe Asn  Asn Asn Ser Ile Lys  Leu Gly Thr Cys Asn  Ile Leu Ala
    1160                1165                1170

Met Glu  Gly Gly Ser Gly His  Thr Val Thr Gly Asn  Ile Asp His
    1175                1180                1185

Phe Phe  Ser Ser Pro Ser Ile  Ser Ser His Ile Pro  Ser Leu Ser
    1190                1195                1200

Ile Tyr  Ser Ala Ile Gly Ile  Glu Thr Glu Asn Leu  Asp Phe Ser
    1205                1210                1215

Lys Lys  Ile Met Met Leu Pro  Asn Ala Pro Ser Arg  Val Phe Trp
    1220                1225                1230

Trp Glu  Thr Gly Ala Val Pro  Gly Leu Arg Ser Leu  Glu Asn Asn
    1235                1240                1245

Gly Thr  Lys Leu Leu Asp Ser  Ile Arg Asp Leu Tyr  Pro Gly Lys
    1250                1255                1260
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Phe Tyr  Trp Arg Phe Tyr Ala  Phe Phe Asp Tyr Ala  Ile Thr Thr
    1265                1270                1275

Leu Lys  Pro Val Tyr Glu Asp  Thr Asn Ile Lys Ile  Lys Leu Asp
    1280                1285                1290

Lys Asp  Thr Arg Asn Phe Ile  Met Pro Thr Ile Thr  Thr Asn Glu
    1295                1300                1305

Ile Arg  Asn Lys Leu Ser Tyr  Ser Phe Asp Gly Ala  Gly Gly Thr
    1310                1315                1320

Tyr Ser  Leu Leu Leu Ser Ser  Tyr Pro Ile Ser Thr  Asn Ile Asn
    1325                1330                1335

Leu Ser  Lys Asp Asp Leu Trp  Ile Phe Asn Ile Asp  Asn Glu Val
    1340                1345                1350

Arg Glu  Ile Ser Ile Glu Asn  Gly Thr Ile Lys Lys  Gly Lys Leu
    1355                1360                1365

Ile Lys  Asp Val Leu Ser Lys  Ile Asp Ile Asn Lys  Asn Lys Leu
    1370                1375                1380

Ile Ile  Gly Asn Gln Thr Ile  Asp Phe Ser Gly Asp  Ile Asp Asn
    1385                1390                1395

Lys Asp  Arg Tyr Ile Phe Leu  Thr Cys Glu Leu Asp  Asp Lys Ile
    1400                1405                1410

Ser Leu  Ile Ile Glu Ile Asn  Leu Val Ala Lys Ser  Tyr Ser Leu
    1415                1420                1425

Leu Leu  Ser Gly Asp Lys Asn  Tyr Leu Ile Ser Asn  Leu Ser Asn
    1430                1435                1440

Thr Ile  Glu Lys Ile Asn Thr  Leu Gly Leu Asp Ser  Lys Asn Ile
    1445                1450                1455
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Ala Tyr  Asn Tyr Thr Asp Glu  Ser Asn Asn Lys Tyr  Phe Gly Ala
    1460                1465                1470

Ile Ser  Lys Thr Ser Gln Lys  Ser Ile Ile His Tyr  Lys Lys Asp
    1475                1480                1485

Ser Lys  Asn Ile Leu Glu Phe  Tyr Asn Gly Ser Thr  Leu Glu Phe
    1490                1495                1500

Asn Ser  Lys Asp Phe Ile Ala  Glu Asp Ile Asn Val  Phe Met Lys
    1505                1510                1515

Asp Asp  Ile Asn Thr Ile Thr  Gly Lys Tyr Tyr Val  Asp Asn Asn
    1520                1525                1530

Thr Asp  Lys Ser Ile Asp Phe  Ser Ile Ser Leu Val  Ser Lys Asn
    1535                1540                1545

Gln Val  Lys Val Asn Gly Leu  Tyr Leu Asn Glu Ser  Val Tyr Ser
    1550                1555                1560

Ser Tyr  Leu Asp Phe Val Lys  Asn Ser Asp Gly His  His Asn Thr
    1565                1570                1575

Ser Asn  Phe Met Asn Leu Phe  Leu Asp Asn Ile Ser  Phe Trp Lys
    1580                1585                1590

Leu Phe  Gly Phe Glu Asn Ile  Asn Phe Val Ile Asp  Lys Tyr Phe
    1595                1600                1605

Thr Leu  Val Gly Lys Thr Asn  Leu Gly Tyr Val Glu  Phe Ile Cys
    1610                1615                1620

Asp Asn  Asn Lys Asn Ile Asp  Ile Tyr Phe Gly Glu  Trp Lys Thr
    1625                1630                1635

Ser Ser  Ser Lys Ser Thr Ile  Phe Ser Gly Asn Gly  Arg Asn Val
    1640                1645                1650
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Val Val  Glu Pro Ile Tyr Asn  Pro Asp Thr Gly Glu  Asp Ile Ser
    1655                1660                1665

Thr Ser  Leu Asp Phe Ser Tyr  Glu Pro Leu Tyr Gly  Ile Asp Arg
    1670                1675                1680

Tyr Ile  Asn Lys Val Leu Ile  Ala Pro Asp Leu Tyr  Thr Ser Leu
    1685                1690                1695

Ile Asn  Ile Asn Thr Asn Tyr  Tyr Ser Asn Glu Tyr  Tyr Pro Glu
    1700                1705                1710

Ile Ile  Val Leu Asn Pro Asn  Thr Phe His Lys Lys  Val Asn Ile
    1715                1720                1725

Asn Leu  Asp Ser Ser Ser Phe  Glu Tyr Lys Trp Ser  Thr Glu Gly
    1730                1735                1740

Ser Asp  Phe Ile Leu Val Arg  Tyr Leu Glu Glu Ser  Asn Lys Lys
    1745                1750                1755

Ile Leu  Gln Lys Ile Arg Ile  Lys Gly Ile Leu Ser  Asn Thr Gln
    1760                1765                1770

Ser Phe  Asn Lys Met Ser Ile  Asp Phe Lys Asp Ile  Lys Lys Leu
    1775                1780                1785

Ser Leu  Gly Tyr Ile Met Ser  Asn Phe Lys Ser Phe  Asn Ser Glu
    1790                1795                1800

Asn Glu  Leu Asp Arg Asp His  Leu Gly Phe Lys Ile  Ile Asp Asn
    1805                1810                1815

Lys Thr  Tyr Tyr Tyr Asp Glu  Asp Ser Lys Leu Val  Lys Gly Leu
    1820                1825                1830

Ile Asn  Ile Asn Asn Ser Leu  Phe Tyr Phe Asp Pro  Ile Glu Phe
    1835                1840                1845
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Asn Leu  Val Thr Gly Trp Gln  Thr Ile Asn Gly Lys  Lys Tyr Tyr
    1850                1855                1860

Phe Asp  Ile Asn Thr Gly Ala  Ala Leu Thr Ser Tyr  Lys Ile Ile
    1865                1870                1875

Asn Gly  Lys His Phe Tyr Phe  Asn Asn Asp Gly Val  Met Gln Leu
    1880                1885                1890

Gly Val  Phe Lys Gly Pro Asp  Gly Phe Glu Tyr Phe  Ala Pro Ala
    1895                1900                1905

Asn Thr  Gln Asn Asn Asn Ile  Glu Gly Gln Ala Ile  Val Tyr Gln
    1910                1915                1920

Ser Lys  Phe Leu Thr Leu Asn  Gly Lys Lys Tyr Tyr  Phe Asp Asn
    1925                1930                1935

Asp Ser  Lys Ala Val Thr Gly  Trp Arg Ile Ile Asn  Asn Glu Lys
    1940                1945                1950

Tyr Tyr  Phe Asn Pro Asn Asn  Ala Ile Ala Ala Val  Gly Leu Gln
    1955                1960                1965

Val Ile  Asp Asn Asn Lys Tyr  Tyr Phe Asn Pro Asp  Thr Ala Ile
    1970                1975                1980

Ile Ser  Lys Gly Trp Gln Thr  Val Asn Gly Ser Arg  Tyr Tyr Phe
    1985                1990                1995

Asp Thr  Asp Thr Ala Ile Ala  Phe Asn Gly Tyr Lys  Thr Ile Asp
    2000                2005                2010

Gly Lys  His Phe Tyr Phe Asp  Ser Asp Cys Val Val  Lys Ile Gly
    2015                2020                2025

Val Phe  Ser Thr Ser Asn Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2030                2035                2040
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Thr Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
2045 2050 2055

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asp Asn
2060 2065 2070

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr
2075 2080 2085

Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr
2090 2095 2100

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala
2105 2110 2115

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2120 2125 2130

Thr Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
2135 2140 2145

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2150 2155 2160

Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2165 2170 2175

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu
2180 2185 2190

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser
2195 2200 2205

Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile
2225 2230 2235

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Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn
2240 2245 2250

Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn
2255 2260 2265

Asn Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly
2270 2275 2280

Phe Glu Tyr Phe Ala Pro Ala Asn Thr Tyr Asn Asn Asn Ile Glu
2285 2290 2295

Gly Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly
2300 2305 2310

Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp
2315 2320 2325

Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala
2330 2335 2340

Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr
2345 2350 2355

Phe Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2360 2365 2370

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser
2375 2380 2385

Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr
2390 2395 2400

Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe
2405 2410 2415

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2420 2425 2430

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Gln Ala  Ile Leu Tyr Gln Asn  Lys Phe Leu Thr Leu  Asn Gly Lys
    2435                 2440                 2445

Lys Tyr  Tyr Phe Gly Ser Asp  Ser Lys Ala Val Thr  Gly Leu Arg
    2450                 2455                 2460

Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn Thr Asn  Thr Ala Val
    2465                 2470                 2475

Ala Val  Thr Gly Trp Gln Thr  Ile Asn Gly Lys Lys  Tyr Tyr Phe
    2480                 2485                 2490

Asn Thr  Asn Thr Ser Ile Ala  Ser Thr Gly Tyr Thr  Ile Ile Ser
    2495                 2500                 2505

Gly Lys  His Phe Tyr Phe Asn  Thr Asp Gly Ile Met  Gln Ile Gly
    2510                 2515                 2520

Val Phe  Lys Gly Pro Asp Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2525                 2530                 2535

Thr Asp  Ala Asn Asn Ile Glu  Gly Gln Ala Ile Arg  Tyr Gln Asn
    2540                 2545                 2550

Arg Phe  Leu Tyr Leu His Asp  Asn Ile Tyr Tyr Phe  Gly Asn Asn
    2555                 2560                 2565

Ser Lys  Ala Ala Thr Gly Trp  Val Thr Ile Asp Gly  Asn Arg Tyr
    2570                 2575                 2580

Tyr Phe  Glu Pro Asn Thr Ala  Met Gly Ala Asn Gly  Tyr Lys Thr
    2585                 2590                 2595

Ile Asp  Asn Lys Asn Phe Tyr  Phe Arg Asn Gly Leu  Pro Gln Ile
    2600                 2605                 2610

Gly Val  Phe Lys Gly Ser Asn  Gly Phe Glu Tyr Phe  Ala Pro Ala
    2615                 2620                 2625
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Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln
2630 2635 2640

Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly
2705 2710

<210> 140
<211> 2710
<212> PRT
<213> Clostridium difficile

<400> 140

Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1 5 10 15

Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
20 25 30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
35 40 45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr
50 55 60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65 70 75 80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn

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                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
            100                 105                 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
        115                 120                 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
    130                 135                 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
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290 295 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
325 330 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
340 345 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
355 360 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
370 375 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385 390 395 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
405 410 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
420 425 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
435 440 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
450 455 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465 470 475 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
485 490 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu

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            500                 505                 510

Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
        515                 520                 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
    530                 535                 540

Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545                 550                 555                 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
                565                 570                 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
            580                 585                 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
        595                 600                 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
    610                 615                 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625                 630                 635                 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
                645                 650                 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
            660                 665                 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
        675                 680                 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
    690                 695                 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
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705 710 715 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser
725 730 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
740 745 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
755 760 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
770 775 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785 790 795 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
805 810 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
820 825 830

Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
835 840 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
850 855 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865 870 875 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
885 890 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
900 905 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr

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915 920 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
930 935 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945 950 955 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
965 970 975

Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
980 985 990

Ala Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln
995 1000 1005

Leu Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val
1010 1015 1020

Leu Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu
1025 1030 1035

Asp Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu
1040 1045 1050

His Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val
1055 1060 1065

Leu Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser
1070 1075 1080

Ile Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile
1085 1090 1095

Ala Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu
1100 1105 1110

Ile Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His

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1115 1120 1125

Leu Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp
1130 1135 1140

Lys Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp
1145 1150 1155

Phe Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala
1160 1165 1170

Met Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His
1175 1180 1185

Phe Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser
1190 1195 1200

Ile Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser
1205 1210 1215

Lys Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp
1220 1225 1230

Trp Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp
1235 1240 1245

Gly Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys
1250 1255 1260

Phe Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr
1265 1270 1275

Leu Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp
1280 1285 1290

Lys Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu
1295 1300 1305

Ile Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr

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1310 1315 1320

Tyr Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn
1325 1330 1335

Leu Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val
1340 1345 1350

Arg Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu
1355 1360 1365

Ile Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu
1370 1375 1380

Ile Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn
1385 1390 1395

Lys Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile
1400 1405 1410

Ser Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu
1415 1420 1425

Leu Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn
1430 1435 1440

Thr Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile
1445 1450 1455

Ala Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala
1460 1465 1470

Ile Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp
1475 1480 1485

Ser Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe
1490 1495 1500

Asn Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys

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1505 1510 1515

Asp Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn
1520 1525 1530

Thr Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn
1535 1540 1545

Gln Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser
1550 1555 1560

Ser Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr
1565 1570 1575

Ser Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys
1580 1585 1590

Leu Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe
1595 1600 1605

Thr Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys
1610 1615 1620

Asp Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr
1625 1630 1635

Ser Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val
1640 1645 1650

Val Val Glu Pro Ile Tyr Asn Pro Asn Thr Gly Glu Asp Ile Ser
1655 1660 1665

Thr Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg
1670 1675 1680

Tyr Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu
1685 1690 1695

Ile Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu

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1700 1705 1710

Ile Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile
1715 1720 1725

Asn Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly
1730 1735 1740

Ser Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys
1745 1750 1755

Ile Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln
1760 1765 1770

Ser Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu
1775 1780 1785

Ser Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu
1790 1795 1800

Asn Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn
1805 1810 1815

Lys Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu
1820 1825 1830

Ile Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe
1835 1840 1845

Asn Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr
1850 1855 1860

Phe Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile
1865 1870 1875

Asn Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu
1880 1885 1890

Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala

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1895 1900 1905

Asn Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln
1910 1915 1920

Ser Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn
1925 1930 1935

Asn Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys
1940 1945 1950

Tyr Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln
1955 1960 1965

Val Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile
1970 1975 1980

Ile Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe
1985 1990 1995

Asp Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp
2000 2005 2010

Gly Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly
2015 2020 2025

Val Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2030 2035 2040

Thr Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
2045 2050 2055

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
2060 2065 2070

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr
2075 2080 2085

Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr

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2090 2095 2100

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala
2105 2110 2115

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2120 2125 2130

Thr Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
2135 2140 2145

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2150 2155 2160

Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2165 2170 2175

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu
2180 2185 2190

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser
2195 2200 2205

Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile
2225 2230 2235

Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn
2240 2245 2250

Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn
2255 2260 2265

Asn Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly
2270 2275 2280

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu

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2285 2290 2295

Gly Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly
2300 2305 2310

Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp
2315 2320 2325

Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala
2330 2335 2340

Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr
2345 2350 2355

Phe Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2360 2365 2370

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser
2375 2380 2385

Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr
2390 2395 2400

Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe
2405 2410 2415

Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly
2420 2425 2430

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2435 2440 2445

Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg
2450 2455 2460

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val
2465 2470 2475

Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe

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2480 2485 2490

Asn Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser
2495 2500 2505

Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly
2510 2515 2520

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2525 2530 2535

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2540 2545 2550

Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn
2555 2560 2565

Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr
2570 2575 2580

Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr
2585 2590 2595

Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile
2600 2605 2610

Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala
2615 2620 2625

Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln
2630 2635 2640

Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu

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2675 2680 2685

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly
2705 2710

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<211> 2366
<212> PRT
<213> Clostridium difficile

<400> 141

Met Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg
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Phe Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
20 25 30

Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
35 40 45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
50 55 60

Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65 70 75 80

Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys
85 90 95

Asn Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
100 105 110

Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
115 120 125

Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
130 135 140

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```
Val Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145                 150                 155                 160

Leu Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met
                165                 170                 175

Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala
            180                 185                 190

Gln Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr
        195                 200                 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr
    210                 215                 220

Ile Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val
225                 230                 235                 240

Arg Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu
                245                 250                 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu
            260                 265                 270

Arg Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp
        275                 280                 285

Met Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro
    290                 295                 300

Ser Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile
305                 310                 315                 320

Met Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp
                325                 330                 335

Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
            340                 345                 350
```

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```
Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala
        355                 360                 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn
    370                 375                 380

Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val
385                 390                 395                 400

Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro
                405                 410                 415

Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile
            420                 425                 430

Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met
        435                 440                 445

Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr
    450                 455                 460

Thr Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp
465                 470                 475                 480

Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala
                485                 490                 495

Asp Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr
            500                 505                 510

Glu Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys
        515                 520                 525

Ala Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly
    530                 535                 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu
545                 550                 555                 560
```

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Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly
565 570 575

Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
580 585 590

Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe
595 600 605

Gln Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly
610 615 620

Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile
625 630 635 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp
645 650 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser
660 665 670

Thr Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro
675 680 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser
690 695 700

Ile Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys
705 710 715 720

Asp Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
725 730 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg
740 745 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
755 760 765

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```
Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
    770                 775                 780

Asn Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785                 790                 795                 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu
                805                 810                 815

Glu Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
            820                 825                 830

Asp Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr
        835                 840                 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser
    850                 855                 860

Ile Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp
865                 870                 875                 880

Ser His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe
                885                 890                 895

Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
            900                 905                 910

Thr Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu
        915                 920                 925

Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
    930                 935                 940

Val Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn
945                 950                 955                 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu
                965                 970                 975
```

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```
Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
            980                 985                 990

Leu Phe Ser Thr Gly Leu Asn Thr  Ile Thr Asp Ala Ala  Lys Val Val
        995                 1000                1005

Glu Leu  Val Ser Thr Ala Leu  Asp Glu Thr Ile Asp  Leu Leu Pro
    1010                1015                1020

Thr Leu  Ser Glu Gly Leu Pro  Ile Ile Ala Thr Ile  Ile Asp Gly
    1025                1030                1035

Val Ser  Leu Gly Ala Ala Ile  Lys Glu Leu Ser Glu  Thr Ser Asp
    1040                1045                1050

Pro Leu  Leu Arg Gln Glu Ile  Glu Ala Lys Ile Gly  Ile Met Ala
    1055                1060                1065

Val Asn  Leu Thr Thr Ala Thr  Thr Ala Ile Ile Thr  Ser Ser Leu
    1070                1075                1080

Gly Val  Ala Ser Gly Phe Ser  Ile Leu Leu Val Pro  Leu Ala Gly
    1085                1090                1095

Ile Ser  Ala Gly Ile Pro Ser  Leu Val Asn Asn Glu  Leu Val Leu
    1100                1105                1110

Arg Asp  Lys Ala Thr Lys Val  Val Asp Tyr Phe Lys  His Val Ser
    1115                1120                1125

Leu Val  Glu Thr Glu Gly Val  Phe Thr Leu Leu Asp  Asp Lys Ile
    1130                1135                1140

Met Met  Pro Gln Asp Asp Leu  Val Ile Ser Glu Ile  Asp Phe Asn
    1145                1150                1155

Asn Asn  Ser Ile Val Leu Gly  Lys Cys Glu Ile Trp  Arg Met Glu
    1160                1165                1170
```

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```
Gly Gly  Ser Gly His Thr Val  Thr Asp Asp Ile Asp  His Phe Phe
    1175                1180                1185

Ser Ala  Pro Ser Ile Thr Tyr  Arg Glu Pro His Leu  Ser Ile Tyr
    1190                1195                1200

Asp Val  Leu Glu Val Gln Lys  Glu Glu Leu Asp Leu  Ser Lys Asp
    1205                1210                1215

Leu Met  Val Leu Pro Asn Ala  Pro Asn Arg Val Phe  Ala Trp Glu
    1220                1225                1230

Thr Gly  Trp Thr Pro Gly Leu  Arg Ser Leu Glu Asn  Asp Gly Thr
    1235                1240                1245

Lys Leu  Leu Asp Arg Ile Arg  Asp Asn Tyr Glu Gly  Glu Phe Tyr
    1250                1255                1260

Trp Arg  Tyr Phe Ala Phe Ile  Ala Asp Ala Leu Ile  Thr Thr Leu
    1265                1270                1275

Lys Pro  Arg Tyr Glu Asp Thr  Asn Ile Arg Ile Asn  Leu Asp Ser
    1280                1285                1290

Asn Thr  Arg Ser Phe Ile Val  Pro Ile Ile Thr Thr  Glu Tyr Ile
    1295                1300                1305

Arg Glu  Lys Leu Ser Tyr Ser  Phe Tyr Gly Ser Gly  Gly Thr Tyr
    1310                1315                1320

Ala Leu  Ser Leu Ser Gln Tyr  Asn Met Gly Ile Asn  Ile Glu Leu
    1325                1330                1335

Ser Glu  Ser Asp Val Trp Ile  Ile Asp Val Asp Asn  Val Val Arg
    1340                1345                1350

Asp Val  Thr Ile Glu Ser Asp  Lys Ile Lys Lys Gly  Asp Leu Ile
    1355                1360                1365
```

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Glu Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile
1370 1375 1380

Leu Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser
1385 1390 1395

Asn Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn
1400 1405 1410

Ala Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu
1415 1420 1425

Ile Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile
1430 1435 1440

Gln Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys
1445 1450 1455

Asn Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly
1460 1465 1470

Phe Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu
1475 1480 1485

Pro Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys
1490 1495 1500

Pro Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val
1505 1510 1515

Ile Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys
1520 1525 1530

Asp Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys
1535 1540 1545

Thr Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala
1550 1555 1560

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Glu Ile Leu Lys Phe Met Asn Arg Lys Gly Asn Thr Asn Thr Ser
1565 1570 1575

Asp Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile
1580 1585 1590

Phe Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala
1595 1600 1605

Asn Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe
1610 1615 1620

Ile Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe
1625 1630 1635

Asn Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln
1640 1645 1650

Asn Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp
1655 1660 1665

Ile Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly
1670 1675 1680

Ile Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr
1685 1690 1695

Thr Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr
1700 1705 1710

Tyr Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys
1715 1720 1725

Ile Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser
1730 1735 1740

Asn Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn
1745 1750 1755

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```
Lys Val  Ser Gln Val Lys Ile  Arg Phe Val Asn Val  Phe Lys Asp
    1760                1765                1770

Lys Thr  Leu Ala Asn Lys Leu  Ser Phe Asn Phe Ser  Asp Lys Gln
    1775                1780                1785

Asp Val  Pro Val Ser Glu Ile  Ile Leu Ser Phe Thr  Pro Ser Tyr
    1790                1795                1800

Tyr Glu  Asp Gly Leu Ile Gly  Tyr Asp Leu Gly Leu  Val Ser Leu
    1805                1810                1815

Tyr Asn  Glu Lys Phe Tyr Ile  Asn Asn Phe Gly Met  Met Val Ser
    1820                1825                1830

Gly Leu  Ile Tyr Ile Asn Asp  Ser Leu Tyr Tyr Phe  Lys Pro Pro
    1835                1840                1845

Val Asn  Asn Leu Ile Thr Gly  Phe Val Thr Val Gly  Asp Asp Lys
    1850                1855                1860

Tyr Tyr  Phe Asn Pro Ile Asn  Gly Gly Ala Ala Ser  Ile Gly Glu
    1865                1870                1875

Thr Ile  Ile Asp Asp Lys Asn  Tyr Tyr Phe Asn Gln  Ser Gly Val
    1880                1885                1890

Leu Gln  Thr Gly Val Phe Ser  Thr Glu Asp Gly Phe  Lys Tyr Phe
    1895                1900                1905

Ala Pro  Ala Asn Thr Leu Asp  Glu Asn Leu Glu Gly  Glu Ala Ile
    1910                1915                1920

Asp Phe  Thr Gly Lys Leu Ile  Ile Asp Glu Asn Ile  Tyr Tyr Phe
    1925                1930                1935

Asp Asp  Asn Tyr Arg Gly Ala  Val Glu Trp Lys Glu  Leu Asp Gly
    1940                1945                1950
```

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Glu Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly
1955 1960 1965

Leu Asn Gln Ile Gly Asp Tyr Lys Tyr Tyr Phe Asn Ser Asp Gly
1970 1975 1980

Val Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr
1985 1990 1995

Phe Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp
2000 2005 2010

Gly Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly
2015 2020 2025

Val Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn
2030 2035 2040

Glu Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly
2045 2050 2055

Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe
2060 2065 2070

Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr
2075 2080 2085

Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu
2090 2095 2100

Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln
2105 2110 2115

Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp
2120 2125 2130

Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
2135 2140 2145

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```
Phe Tyr  Ile Asp Asp Asn Gly  Ile Val Gln Ile Gly  Val Phe Asp
    2150                2155                2160

Thr Ser  Asp Gly Tyr Lys Tyr  Phe Ala Pro Ala Asn  Thr Val Asn
    2165                2170                2175

Asp Asn  Ile Tyr Gly Gln Ala  Val Glu Tyr Ser Gly  Leu Val Arg
    2180                2185                2190

Val Gly  Glu Asp Val Tyr Tyr  Phe Gly Glu Thr Tyr  Thr Ile Glu
    2195                2200                2205

Thr Gly  Trp Ile Tyr Asp Met  Glu Asn Glu Ser Asp  Lys Tyr Tyr
    2210                2215                2220

Phe Asn  Pro Glu Thr Lys Lys  Ala Cys Lys Gly Ile  Asn Leu Ile
    2225                2230                2235

Asp Asp  Ile Lys Tyr Tyr Phe  Asp Glu Lys Gly Ile  Met Arg Thr
    2240                2245                2250

Gly Leu  Ile Ser Phe Glu Asn  Asn Asn Tyr Tyr Phe  Asn Glu Asn
    2255                2260                2265

Gly Glu  Met Gln Phe Gly Tyr  Ile Asn Ile Glu Asp  Lys Met Phe
    2270                2275                2280

Tyr Phe  Gly Glu Asp Gly Val  Met Gln Ile Gly Val  Phe Asn Thr
    2285                2290                2295

Pro Asp  Gly Phe Lys Tyr Phe  Ala His Gln Asn Thr  Leu Asp Glu
    2300                2305                2310

Asn Phe  Glu Gly Glu Ser Ile  Asn Tyr Thr Gly Trp  Leu Asp Leu
    2315                2320                2325

Asp Glu  Lys Arg Tyr Tyr Phe  Thr Asp Glu Tyr Ile  Ala Ala Thr
    2330                2335                2340
```

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Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp
2345 2350 2355

Thr Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 142
<211> 2366
<212> PRT
<213> Clostridium difficile

<400> 142

Met Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg
1 5 10 15

Phe Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
20 25 30

Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
35 40 45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
50 55 60

Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65 70 75 80

Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys
85 90 95

Asn Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
100 105 110

Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
115 120 125

Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
130 135 140

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```
Val Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145                 150                 155                 160

Leu Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met
                165                 170                 175

Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala
            180                 185                 190

Gln Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr
        195                 200                 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr
    210                 215                 220

Ile Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val
225                 230                 235                 240

Arg Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu
                245                 250                 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu
            260                 265                 270

Arg Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp
        275                 280                 285

Met Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro
    290                 295                 300

Ser Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile
305                 310                 315                 320

Met Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp
                325                 330                 335

Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
            340                 345                 350
```

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Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala
355 360 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn
370 375 380

Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val
385 390 395 400

Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro
405 410 415

Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile
420 425 430

Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met
435 440 445

Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr
450 455 460

Thr Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp
465 470 475 480

Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala
485 490 495

Asp Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr
500 505 510

Glu Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys
515 520 525

Ala Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly
530 535 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu
545 550 555 560

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```
Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly
                565                 570                 575

Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
            580                 585                 590

Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe
        595                 600                 605

Gln Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly
    610                 615                 620

Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile
625                 630                 635                 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp
                645                 650                 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser
            660                 665                 670

Thr Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro
        675                 680                 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser
    690                 695                 700

Ile Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys
705                 710                 715                 720

Asp Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
                725                 730                 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg
            740                 745                 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
        755                 760                 765
```

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```
Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
    770                 775                 780

Asn Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785                 790                 795                 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu
                805                 810                 815

Glu Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
            820                 825                 830

Asp Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr
        835                 840                 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser
    850                 855                 860

Ile Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp
865                 870                 875                 880

Ser His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe
                885                 890                 895

Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
            900                 905                 910

Thr Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu
        915                 920                 925

Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
    930                 935                 940

Val Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn
945                 950                 955                 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu
                965                 970                 975
```

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```
Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
            980                 985                 990

Leu Phe Ser Thr Gly Leu Asn Thr  Ile Thr Asp Ala Ala  Lys Val Val
        995                 1000                1005

Glu Leu  Val Ser Thr Ala Leu  Asp Glu Thr Ile Asp  Leu Leu Pro
    1010                1015                1020

Thr Leu  Ser Glu Gly Leu Pro  Ile Ile Ala Thr Ile  Ile Asp Gly
    1025                1030                1035

Val Ser  Leu Gly Ala Ala Ile  Lys Glu Leu Ser Glu  Thr Ser Asp
    1040                1045                1050

Pro Leu  Leu Arg Gln Glu Ile  Glu Ala Lys Ile Gly  Ile Met Ala
    1055                1060                1065

Val Asn  Leu Thr Thr Ala Thr  Thr Ala Ile Ile Thr  Ser Ser Leu
    1070                1075                1080

Gly Val  Ala Ser Gly Phe Ser  Ile Leu Leu Val Pro  Leu Ala Gly
    1085                1090                1095

Ile Ser  Ala Gly Ile Pro Ser  Leu Val Asn Asn Glu  Leu Val Leu
    1100                1105                1110

Arg Asp  Lys Ala Thr Lys Val  Val Asp Tyr Phe Lys  His Val Ser
    1115                1120                1125

Leu Val  Glu Thr Glu Gly Val  Phe Thr Leu Leu Asp  Asp Lys Ile
    1130                1135                1140

Met Met  Pro Gln Asp Asp Leu  Val Ile Ser Glu Ile  Asp Phe Asn
    1145                1150                1155

Asn Asn  Ser Ile Val Leu Gly  Lys Cys Glu Ile Trp  Arg Met Glu
    1160                1165                1170
```

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```
Gly Gly  Ser Gly His Thr Val  Thr Asp Asp Ile Asp  His Phe Phe
    1175                1180                1185

Ser Ala  Pro Ser Ile Thr Tyr  Arg Glu Pro His Leu  Ser Ile Tyr
    1190                1195                1200

Asp Val  Leu Glu Val Gln Lys  Glu Glu Leu Asp Leu  Ser Lys Asp
    1205                1210                1215

Leu Met  Val Leu Pro Asn Ala  Pro Asn Arg Val Phe  Ala Trp Glu
    1220                1225                1230

Thr Gly  Trp Thr Pro Gly Leu  Arg Ser Leu Glu Asn  Asp Gly Thr
    1235                1240                1245

Lys Leu  Leu Asp Arg Ile Arg  Asp Asn Tyr Glu Gly  Glu Phe Tyr
    1250                1255                1260

Trp Arg  Tyr Phe Ala Phe Ile  Ala Asp Ala Leu Ile  Thr Thr Leu
    1265                1270                1275

Lys Pro  Arg Tyr Glu Asp Thr  Asn Ile Arg Ile Asn  Leu Asp Ser
    1280                1285                1290

Asn Thr  Arg Ser Phe Ile Val  Pro Ile Ile Thr Thr  Glu Tyr Ile
    1295                1300                1305

Arg Glu  Lys Leu Ser Tyr Ser  Phe Tyr Gly Ser Gly  Gly Thr Tyr
    1310                1315                1320

Ala Leu  Ser Leu Ser Gln Tyr  Asn Met Gly Ile Asn  Ile Glu Leu
    1325                1330                1335

Ser Glu  Ser Asp Val Trp Ile  Ile Asp Val Asp Asn  Val Val Arg
    1340                1345                1350

Asp Val  Thr Ile Glu Ser Asp  Lys Ile Lys Lys Gly  Asp Leu Ile
    1355                1360                1365
```

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```
Glu Gly  Ile Leu Ser Thr Leu  Ser Ile Glu Glu Asn  Lys Ile Ile
    1370                1375                1380

Leu Asn  Ser His Glu Ile Asn  Phe Ser Gly Glu Val  Asn Gly Ser
    1385                1390                1395

Asn Gly  Phe Val Ser Leu Thr  Phe Ser Ile Leu Glu  Gly Ile Asn
    1400                1405                1410

Ala Ile  Ile Glu Val Asp Leu  Leu Ser Lys Ser Tyr  Lys Leu Leu
    1415                1420                1425

Ile Ser  Gly Glu Leu Lys Ile  Leu Met Leu Asn Ser  Asn His Ile
    1430                1435                1440

Gln Gln  Lys Ile Asp Tyr Ile  Gly Phe Asn Ser Glu  Leu Gln Lys
    1445                1450                1455

Asn Ile  Pro Tyr Ser Phe Val  Asp Ser Glu Gly Lys  Glu Asn Gly
    1460                1465                1470

Phe Ile  Asn Gly Ser Thr Lys  Glu Gly Leu Phe Val  Ser Glu Leu
    1475                1480                1485

Pro Asp  Val Val Leu Ile Ser  Lys Val Tyr Met Asp  Asp Ser Lys
    1490                1495                1500

Pro Ser  Phe Gly Tyr Tyr Ser  Asn Asn Leu Lys Asp  Val Lys Val
    1505                1510                1515

Ile Thr  Lys Asp Asn Val Asn  Ile Leu Thr Gly Tyr  Tyr Leu Lys
    1520                1525                1530

Asp Asp  Ile Lys Ile Ser Leu  Ser Leu Thr Leu Gln  Asp Glu Lys
    1535                1540                1545

Thr Ile  Lys Leu Asn Ser Val  His Leu Asp Glu Ser  Gly Val Ala
    1550                1555                1560
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Glu Ile Leu Lys Phe Met Asn Arg Lys Gly Ser Thr Asn Thr Ser
1565 1570 1575

Asp Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile
1580 1585 1590

Phe Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala
1595 1600 1605

Asn Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe
1610 1615 1620

Ile Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe
1625 1630 1635

Asn Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln
1640 1645 1650

Asn Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp
1655 1660 1665

Ile Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly
1670 1675 1680

Ile Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr
1685 1690 1695

Thr Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr
1700 1705 1710

Tyr Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys
1715 1720 1725

Ile Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser
1730 1735 1740

Asn Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn
1745 1750 1755

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Lys Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp
1760 1765 1770

Lys Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln
1775 1780 1785

Asp Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr
1790 1795 1800

Tyr Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu
1805 1810 1815

Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser
1820 1825 1830

Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro
1835 1840 1845

Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys
1850 1855 1860

Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu
1865 1870 1875

Thr Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val
1880 1885 1890

Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
1895 1900 1905

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile
1910 1915 1920

Asp Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe
1925 1930 1935

Asp Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly
1940 1945 1950

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Glu Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly
1955 1960 1965

Leu Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly
1970 1975 1980

Val Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr
1985 1990 1995

Phe Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp
2000 2005 2010

Gly Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly
2015 2020 2025

Val Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn
2030 2035 2040

Glu Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly
2045 2050 2055

Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe
2060 2065 2070

Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr
2075 2080 2085

Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu
2090 2095 2100

Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln
2105 2110 2115

Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp
2120 2125 2130

Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
2135 2140 2145

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```
Phe Tyr  Ile Asp Asp Asn Gly  Ile Val Gln Ile Gly  Val Phe Asp
    2150                 2155                 2160

Thr Ser  Asp Gly Tyr Lys Tyr  Phe Ala Pro Ala Asn  Thr Val Asn
    2165                 2170                 2175

Asp Asn  Ile Tyr Gly Gln Ala  Val Glu Tyr Ser Gly  Leu Val Arg
    2180                 2185                 2190

Val Gly  Glu Asp Val Tyr Tyr  Phe Gly Glu Thr Tyr  Thr Ile Glu
    2195                 2200                 2205

Thr Gly  Trp Ile Tyr Asp Met  Glu Asn Glu Ser Asp  Lys Tyr Tyr
    2210                 2215                 2220

Phe Asn  Pro Glu Thr Lys Lys  Ala Cys Lys Gly Ile  Asn Leu Ile
    2225                 2230                 2235

Asp Asp  Ile Lys Tyr Tyr Phe  Asp Glu Lys Gly Ile  Met Arg Thr
    2240                 2245                 2250

Gly Leu  Ile Ser Phe Glu Asn  Asn Asn Tyr Tyr Phe  Asn Glu Asn
    2255                 2260                 2265

Gly Glu  Met Gln Phe Gly Tyr  Ile Asn Ile Glu Asp  Lys Met Phe
    2270                 2275                 2280

Tyr Phe  Gly Glu Asp Gly Val  Met Gln Ile Gly Val  Phe Asn Thr
    2285                 2290                 2295

Pro Asp  Gly Phe Lys Tyr Phe  Ala His Gln Asn Thr  Leu Asp Glu
    2300                 2305                 2310

Asn Phe  Glu Gly Glu Ser Ile  Asn Tyr Thr Gly Trp  Leu Asp Leu
    2315                 2320                 2325

Asp Glu  Lys Arg Tyr Tyr Phe  Thr Asp Glu Tyr Ile  Ala Ala Thr
    2330                 2335                 2340
```

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```
Gly Ser  Val Ile Ile Asp Gly  Glu Glu Tyr Tyr Phe  Asp Pro Asp
    2345                2350                2355


Thr Ala  Gln Leu Val Ile Ser  Glu
    2360                2365


<210>  143
<211>  2366
<212>  PRT
<213>  Clostridium difficile

<400>  143

Met Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg
1               5                   10                  15


Phe Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
            20                  25                  30


Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
        35                  40                  45


Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
    50                  55                  60


Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65                  70                  75                  80


Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys
                85                  90                  95


Asn Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
            100                 105                 110


Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
        115                 120                 125


Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
    130                 135                 140
```

```
Val Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145                 150                 155                 160

Leu Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met
                165                 170                 175

Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala
            180                 185                 190

Gln Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr
        195                 200                 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr
    210                 215                 220

Ile Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val
225                 230                 235                 240

Arg Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu
                245                 250                 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu
            260                 265                 270

Arg Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp
        275                 280                 285

Met Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro
    290                 295                 300

Ser Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile
305                 310                 315                 320

Met Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp
                325                 330                 335

Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
            340                 345                 350
```

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```
Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala
        355                 360                 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn
    370                 375                 380

Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val
385                 390                 395                 400

Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro
                405                 410                 415

Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile
            420                 425                 430

Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met
        435                 440                 445

Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr
    450                 455                 460

Thr Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp
465                 470                 475                 480

Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala
                485                 490                 495

Asp Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr
            500                 505                 510

Glu Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ser Arg Ala Lys
        515                 520                 525

Ala Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly
    530                 535                 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu
545                 550                 555                 560
```

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```
Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly
                565                 570                 575

Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
            580                 585                 590

Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe
        595                 600                 605

Gln Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly
    610                 615                 620

Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile
625                 630                 635                 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp
                645                 650                 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser
            660                 665                 670

Thr Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro
        675                 680                 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser
    690                 695                 700

Ile Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys
705                 710                 715                 720

Asp Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
                725                 730                 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg
            740                 745                 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
        755                 760                 765
```

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```
Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
    770                 775                 780

Asn Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785                 790                 795                 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu
                805                 810                 815

Glu Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
            820                 825                 830

Asp Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr
        835                 840                 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser
    850                 855                 860

Ile Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp
865                 870                 875                 880

Ser His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe
                885                 890                 895

Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
            900                 905                 910

Thr Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu
        915                 920                 925

Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
    930                 935                 940

Val Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn
945                 950                 955                 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu
                965                 970                 975
```

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```
Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
            980                 985                 990

Leu Phe Ser Thr Gly Leu Asn Thr  Ile Thr Asp Ala Ala  Lys Val Val
        995                 1000                1005

Glu Leu  Val Ser Thr Ala Leu  Asp Glu Thr Ile Asp  Leu Leu Pro
    1010                1015                1020

Thr Leu  Ser Glu Gly Leu Pro  Ile Ile Ala Thr Ile  Ile Asp Gly
    1025                1030                1035

Val Ser  Leu Gly Ala Ala Ile  Lys Glu Leu Ser Glu  Thr Ser Asp
    1040                1045                1050

Pro Leu  Leu Arg Gln Glu Ile  Glu Ala Lys Ile Gly  Ile Met Ala
    1055                1060                1065

Val Asn  Leu Thr Thr Ala Thr  Thr Ala Ile Ile Thr  Ser Ser Leu
    1070                1075                1080

Gly Val  Ala Ser Gly Phe Ser  Ile Leu Leu Val Pro  Leu Ala Gly
    1085                1090                1095

Ile Ser  Ala Gly Ile Pro Ser  Leu Val Asn Asn Glu  Leu Val Leu
    1100                1105                1110

Arg Asp  Lys Ala Thr Lys Val  Val Asp Tyr Phe Lys  His Val Ser
    1115                1120                1125

Leu Val  Glu Thr Glu Gly Val  Phe Thr Leu Leu Asp  Asp Lys Ile
    1130                1135                1140

Met Met  Pro Gln Asp Asp Leu  Val Ile Ser Glu Ile  Asp Phe Asn
    1145                1150                1155

Asn Asn  Ser Ile Val Leu Gly  Lys Cys Glu Ile Trp  Arg Met Glu
    1160                1165                1170
```

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```
Gly Gly  Ser Gly His Thr Val  Thr Asp Asp Ile Asp  His Phe Phe
    1175                1180                1185

Ser Ala  Pro Ser Ile Thr Tyr  Arg Glu Pro His Leu  Ser Ile Tyr
    1190                1195                1200

Asp Val  Leu Glu Val Gln Lys  Glu Glu Leu Asp Leu  Ser Lys Asp
    1205                1210                1215

Leu Met  Val Leu Pro Asn Ala  Pro Asn Arg Val Phe  Ala Trp Glu
    1220                1225                1230

Thr Gly  Trp Thr Pro Gly Leu  Arg Ser Leu Glu Asn  Asp Gly Thr
    1235                1240                1245

Lys Leu  Leu Asp Arg Ile Arg  Asp Asn Tyr Glu Gly  Glu Phe Tyr
    1250                1255                1260

Trp Arg  Tyr Phe Ala Phe Ile  Ala Asp Ala Leu Ile  Thr Thr Leu
    1265                1270                1275

Lys Pro  Arg Tyr Glu Asp Thr  Asn Ile Arg Ile Asn  Leu Asp Ser
    1280                1285                1290

Asn Thr  Arg Ser Phe Ile Val  Pro Ile Ile Thr Thr  Glu Tyr Ile
    1295                1300                1305

Arg Glu  Lys Leu Ser Tyr Ser  Phe Tyr Gly Ser Gly  Gly Thr Tyr
    1310                1315                1320

Ala Leu  Ser Leu Ser Gln Tyr  Asn Met Gly Ile Asn  Ile Glu Leu
    1325                1330                1335

Ser Glu  Ser Asp Val Trp Ile  Ile Asp Val Asp Asn  Val Val Arg
    1340                1345                1350

Asp Val  Thr Ile Glu Ser Asp  Lys Ile Lys Lys Gly  Asp Leu Ile
    1355                1360                1365
```

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```
Glu Gly  Ile Leu Ser Thr Leu  Ser Ile Glu Glu Asn  Lys Ile Ile
    1370                1375                1380

Leu Asn  Ser His Glu Ile Asn  Phe Ser Gly Glu Val  Asn Gly Ser
    1385                1390                1395

Asn Gly  Phe Val Ser Leu Thr  Phe Ser Ile Leu Glu  Gly Ile Asn
    1400                1405                1410

Ala Ile  Ile Glu Val Asp Leu  Leu Ser Lys Ser Tyr  Lys Leu Leu
    1415                1420                1425

Ile Ser  Gly Glu Leu Lys Ile  Leu Met Leu Asn Ser  Asn His Ile
    1430                1435                1440

Gln Gln  Lys Ile Asp Tyr Ile  Gly Phe Asn Ser Glu  Leu Gln Lys
    1445                1450                1455

Asn Ile  Pro Tyr Ser Phe Val  Asp Ser Glu Gly Lys  Glu Asn Gly
    1460                1465                1470

Phe Ile  Asn Gly Ser Thr Lys  Glu Gly Leu Phe Val  Ser Glu Leu
    1475                1480                1485

Pro Asp  Val Val Leu Ile Ser  Lys Val Tyr Met Asp  Asp Ser Lys
    1490                1495                1500

Pro Ser  Phe Gly Tyr Tyr Ser  Asn Asn Leu Lys Asp  Val Lys Val
    1505                1510                1515

Ile Thr  Lys Asp Asn Val Asn  Ile Leu Thr Gly Tyr  Tyr Leu Lys
    1520                1525                1530

Asp Asp  Ile Lys Ile Ser Leu  Ser Leu Thr Leu Gln  Asp Glu Lys
    1535                1540                1545

Thr Ile  Lys Leu Asn Ser Val  His Leu Asp Glu Ser  Gly Val Ala
    1550                1555                1560
```

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```
Glu Ile  Leu Lys Phe Met Asn  Arg Lys Gly Ser Thr  Asn Thr Ser
    1565                1570                1575

Asp Ser  Leu Met Ser Phe Leu  Glu Ser Met Asn Ile  Lys Ser Ile
    1580                1585                1590

Phe Val  Asn Phe Leu Gln Ser  Asn Ile Lys Phe Ile  Leu Asp Ala
    1595                1600                1605

Asn Phe  Ile Ile Ser Gly Thr  Thr Ser Ile Gly Gln  Phe Glu Phe
    1610                1615                1620

Ile Cys  Asp Glu Asn Asp Asn  Ile Gln Pro Tyr Phe  Ile Lys Phe
    1625                1630                1635

Asn Thr  Leu Glu Thr Asn Tyr  Thr Leu Tyr Val Gly  Asn Arg Gln
    1640                1645                1650

Asn Met  Ile Val Glu Pro Asn  Tyr Asp Leu Asp Asp  Ser Gly Asp
    1655                1660                1665

Ile Ser  Ser Thr Val Ile Asn  Phe Ser Gln Lys Tyr  Leu Tyr Gly
    1670                1675                1680

Ile Asp  Ser Cys Val Asn Lys  Val Val Ile Ser Pro  Asn Ile Tyr
    1685                1690                1695

Thr Asp  Glu Ile Asn Ile Thr  Pro Val Tyr Glu Thr  Asn Asn Thr
    1700                1705                1710

Tyr Pro  Glu Val Ile Val Leu  Asp Ala Asn Tyr Ile  Asn Glu Lys
    1715                1720                1725

Ile Asn  Val Asn Ile Asn Asp  Leu Ser Ile Arg Tyr  Val Trp Ser
    1730                1735                1740

Asn Asp  Gly Asn Asp Phe Ile  Leu Met Ser Thr Ser  Glu Glu Asn
    1745                1750                1755
```

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```
Lys Val  Ser Gln Val Lys Ile  Arg Phe Val Asn Val  Phe Lys Asp
    1760                1765                1770

Lys Thr  Leu Ala Asn Lys Leu  Ser Phe Asn Phe Ser  Asp Lys Gln
    1775                1780                1785

Asp Val  Pro Val Ser Glu Ile  Ile Leu Ser Phe Thr  Pro Ser Tyr
    1790                1795                1800

Tyr Glu  Asp Gly Leu Ile Gly  Tyr Asp Leu Gly Leu  Val Ser Leu
    1805                1810                1815

Tyr Asn  Glu Lys Phe Tyr Ile  Asn Asn Phe Gly Met  Met Val Ser
    1820                1825                1830

Gly Leu  Ile Tyr Ile Asn Asp  Ser Leu Tyr Tyr Phe  Lys Pro Pro
    1835                1840                1845

Val Asn  Asn Leu Ile Thr Gly  Phe Val Thr Val Gly  Asp Asp Lys
    1850                1855                1860

Tyr Tyr  Phe Asn Pro Ile Asn  Gly Gly Ala Ala Ser  Ile Gly Glu
    1865                1870                1875

Thr Ile  Ile Asp Asp Lys Asn  Tyr Tyr Phe Asn Gln  Ser Gly Val
    1880                1885                1890

Leu Gln  Thr Gly Val Phe Ser  Thr Glu Asp Gly Phe  Lys Tyr Phe
    1895                1900                1905

Ala Pro  Ala Asn Thr Leu Asp  Glu Asn Leu Glu Gly  Glu Ala Ile
    1910                1915                1920

Asp Phe  Thr Gly Lys Leu Ile  Ile Asp Glu Asn Ile  Tyr Tyr Phe
    1925                1930                1935

Asp Asp  Asn Tyr Arg Gly Ala  Val Glu Trp Lys Glu  Leu Asp Gly
    1940                1945                1950
```

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```
Glu Met  His Tyr Phe Ser Pro  Glu Thr Gly Lys Ala  Phe Lys Gly
    1955                1960                1965

Leu Asn  Gln Ile Gly Asp Asp  Lys Tyr Tyr Phe Asn  Ser Asp Gly
    1970                1975                1980

Val Met  Gln Lys Gly Phe Val  Ser Ile Asn Asp Asn  Lys His Tyr
    1985                1990                1995

Phe Asp  Asp Ser Gly Val Met  Lys Val Gly Tyr Thr  Glu Ile Asp
    2000                2005                2010

Gly Lys  His Phe Tyr Phe Ala  Glu Asn Gly Glu Met  Gln Ile Gly
    2015                2020                2025

Val Phe  Asn Thr Glu Asp Gly  Phe Lys Tyr Phe Ala  His His Asn
    2030                2035                2040

Glu Asp  Leu Gly Asn Glu Glu  Gly Glu Glu Ile Ser  Tyr Ser Gly
    2045                2050                2055

Ile Leu  Asn Phe Asn Asn Lys  Ile Tyr Tyr Phe Asp  Asp Ser Phe
    2060                2065                2070

Thr Ala  Val Val Gly Trp Lys  Asp Leu Glu Asp Gly  Ser Lys Tyr
    2075                2080                2085

Tyr Phe  Asp Glu Asp Thr Ala  Glu Ala Tyr Ile Gly  Leu Ser Leu
    2090                2095                2100

Ile Asn  Asp Gly Gln Tyr Tyr  Phe Asn Asp Asp Gly  Ile Met Gln
    2105                2110                2115

Val Gly  Phe Val Thr Ile Asn  Asp Lys Val Phe Tyr  Phe Ser Asp
    2120                2125                2130

Ser Gly  Ile Ile Glu Ser Gly  Val Gln Asn Ile Asp  Asp Asn Tyr
    2135                2140                2145
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Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp
2150 2155 2160

Thr Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn
2165 2170 2175

Asp Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg
2180 2185 2190

Val Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu
2195 2200 2205

Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile
2225 2230 2235

Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr
2240 2245 2250

Gly Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn
2255 2260 2265

Gly Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe
2270 2275 2280

Tyr Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr
2285 2290 2295

Pro Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu
2300 2305 2310

Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu
2315 2320 2325

Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr
2330 2335 2340

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Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp
2345 2350 2355

Thr Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 144
<211> 2366
<212> PRT
<213> Clostridium difficile

<400> 144

Met Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg
1 5 10 15

Phe Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
20 25 30

Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
35 40 45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
50 55 60

Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65 70 75 80

Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys
85 90 95

Asn Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
100 105 110

Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
115 120 125

Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
130 135 140

Val Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn

145 150 155 160

Leu Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met
165 170 175

Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala
180 185 190

Gln Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr
195 200 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr
210 215 220

Ile Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val
225 230 235 240

Arg Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu
245 250 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu
260 265 270

Arg Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp
275 280 285

Met Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro
290 295 300

Ser Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile
305 310 315 320

Met Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp
325 330 335

Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
340 345 350

Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala

```
        355                 360                 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn
    370                 375                 380

Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val
385                 390                 395                 400

Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro
                405                 410                 415

Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile
            420                 425                 430

Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met
        435                 440                 445

Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr
    450                 455                 460

Thr Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp
465                 470                 475                 480

Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala
                485                 490                 495

Asp Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr
            500                 505                 510

Glu Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ser Arg Ala Lys
        515                 520                 525

Ala Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly
    530                 535                 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu
545                 550                 555                 560

Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly
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565 570 575

Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
580 585 590

Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe
595 600 605

Gln Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly
610 615 620

Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile
625 630 635 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp
645 650 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser
660 665 670

Thr Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro
675 680 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser
690 695 700

Ile Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys
705 710 715 720

Asp Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
725 730 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg
740 745 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
755 760 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu

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770 775 780

Asn Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785 790 795 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu
805 810 815

Glu Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
820 825 830

Asp Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr
835 840 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser
850 855 860

Ile Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp
865 870 875 880

Ser His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe
885 890 895

Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
900 905 910

Thr Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu
915 920 925

Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
930 935 940

Val Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn
945 950 955 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu
965 970 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln

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980 985 990

Leu Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp Ala Ala Lys Val Val
995 1000 1005

Glu Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu Pro
1010 1015 1020

Thr Leu Ser Glu Gly Leu Pro Ile Ile Ala Thr Ile Ile Asp Gly
1025 1030 1035

Val Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp
1040 1045 1050

Pro Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala
1055 1060 1065

Val Asn Leu Thr Thr Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu
1070 1075 1080

Gly Val Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly
1085 1090 1095

Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu
1100 1105 1110

Arg Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Val Ser
1115 1120 1125

Leu Val Glu Thr Glu Gly Val Phe Thr Leu Leu Asp Asp Lys Ile
1130 1135 1140

Met Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn
1145 1150 1155

Asn Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu
1160 1165 1170

Gly Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe

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1175 1180 1185

Ser Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr
1190 1195 1200

Asp Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp
1205 1210 1215

Leu Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu
1220 1225 1230

Thr Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr
1235 1240 1245

Lys Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr
1250 1255 1260

Trp Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu
1265 1270 1275

Lys Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser
1280 1285 1290

Asn Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile
1295 1300 1305

Arg Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr
1310 1315 1320

Ala Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu
1325 1330 1335

Ser Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg
1340 1345 1350

Asp Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile
1355 1360 1365

Glu Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile

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1370 1375 1380

Leu Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser
1385 1390 1395

Asn Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn
1400 1405 1410

Ala Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu
1415 1420 1425

Ile Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile
1430 1435 1440

Gln Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys
1445 1450 1455

Asn Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly
1460 1465 1470

Phe Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu
1475 1480 1485

Pro Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys
1490 1495 1500

Pro Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val
1505 1510 1515

Ile Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys
1520 1525 1530

Asp Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys
1535 1540 1545

Thr Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala
1550 1555 1560

Glu Ile Leu Lys Phe Met Asn Arg Lys Gly Ser Thr Asn Thr Ser

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1565 1570 1575

Asp Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile
1580 1585 1590

Phe Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala
1595 1600 1605

Asn Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe
1610 1615 1620

Ile Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe
1625 1630 1635

Asn Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln
1640 1645 1650

Asn Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp
1655 1660 1665

Ile Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly
1670 1675 1680

Ile Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr
1685 1690 1695

Thr Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr
1700 1705 1710

Tyr Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys
1715 1720 1725

Ile Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser
1730 1735 1740

Asn Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn
1745 1750 1755

Lys Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp

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1760 1765 1770

Lys Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln
1775 1780 1785

Asp Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr
1790 1795 1800

Tyr Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu
1805 1810 1815

Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser
1820 1825 1830

Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro
1835 1840 1845

Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys
1850 1855 1860

Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu
1865 1870 1875

Thr Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val
1880 1885 1890

Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
1895 1900 1905

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile
1910 1915 1920

Asp Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe
1925 1930 1935

Asp Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly
1940 1945 1950

Glu Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly

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1955 1960 1965

Leu Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly
1970 1975 1980

Val Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr
1985 1990 1995

Phe Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp
2000 2005 2010

Gly Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly
2015 2020 2025

Val Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn
2030 2035 2040

Glu Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly
2045 2050 2055

Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe
2060 2065 2070

Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr
2075 2080 2085

Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu
2090 2095 2100

Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln
2105 2110 2115

Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp
2120 2125 2130

Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
2135 2140 2145

Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp

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2150 2155 2160

Thr Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn
2165 2170 2175

Asp Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg
2180 2185 2190

Val Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu
2195 2200 2205

Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile
2225 2230 2235

Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr
2240 2245 2250

Gly Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn
2255 2260 2265

Gly Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe
2270 2275 2280

Tyr Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr
2285 2290 2295

Pro Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu
2300 2305 2310

Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu
2315 2320 2325

Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr
2330 2335 2340

Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp

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2345 2350 2355

Thr Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 145
<211> 2366
<212> PRT
<213> Clostridium difficile

<400> 145

Met Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg
1 5 10 15

Phe Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
20 25 30

Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
35 40 45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
50 55 60

Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65 70 75 80

Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys
85 90 95

Asn Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
100 105 110

Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
115 120 125

Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
130 135 140

Val Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145 150 155 160

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```
Leu Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met
                165                 170                 175

Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala
            180                 185                 190

Gln Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr
        195                 200                 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr
    210                 215                 220

Ile Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val
225                 230                 235                 240

Arg Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu
                245                 250                 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu
            260                 265                 270

Arg Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp
        275                 280                 285

Met Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro
    290                 295                 300

Ser Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile
305                 310                 315                 320

Met Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp
                325                 330                 335

Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
            340                 345                 350

Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala
        355                 360                 365
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Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn
    370                 375                 380

Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val
385                 390                 395                 400

Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro
                405                 410                 415

Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile
            420                 425                 430

Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met
        435                 440                 445

Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr
    450                 455                 460

Thr Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp
465                 470                 475                 480

Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala
                485                 490                 495

Asp Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr
            500                 505                 510

Glu Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ser Arg Ala Lys
        515                 520                 525

Ala Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly
    530                 535                 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu
545                 550                 555                 560

Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly
                565                 570                 575
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```
Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
            580                 585                 590

Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe
        595                 600                 605

Gln Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly
    610                 615                 620

Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile
625                 630                 635                 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp
                645                 650                 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser
            660                 665                 670

Thr Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro
        675                 680                 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser
    690                 695                 700

Ile Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys
705                 710                 715                 720

Asp Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
                725                 730                 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg
            740                 745                 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
        755                 760                 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
    770                 775                 780
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```
Asn Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785                 790                 795                 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu
                805                 810                 815

Glu Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
            820                 825                 830

Asp Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr
        835                 840                 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser
    850                 855                 860

Ile Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp
865                 870                 875                 880

Ser His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe
                885                 890                 895

Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
            900                 905                 910

Thr Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu
        915                 920                 925

Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
    930                 935                 940

Val Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn
945                 950                 955                 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu
                965                 970                 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
            980                 985                 990
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```
Leu Phe Ser Thr Gly Leu Asn Thr  Ile Thr Asp Ala Ala  Lys Val Val
        995                 1000                1005

Glu Leu  Val Ser Thr Ala Leu  Asp Glu Thr Ile Asp  Leu Leu Pro
    1010                1015                1020

Thr Leu  Ser Glu Gly Leu Pro  Ile Ile Ala Thr Ile  Ile Asp Gly
    1025                1030                1035

Val Ser  Leu Gly Ala Ala Ile  Lys Glu Leu Ser Glu  Thr Ser Asp
    1040                1045                1050

Pro Leu  Leu Arg Gln Glu Ile  Glu Ala Lys Ile Gly  Ile Met Ala
    1055                1060                1065

Val Asn  Leu Thr Thr Ala Thr  Thr Ala Ile Ile Thr  Ser Ser Leu
    1070                1075                1080

Gly Val  Ala Ser Gly Phe Ser  Ile Leu Leu Val Pro  Leu Ala Gly
    1085                1090                1095

Ile Ser  Ala Gly Ile Pro Ser  Leu Val Asn Asn Glu  Leu Val Leu
    1100                1105                1110

Arg Asp  Lys Ala Thr Lys Val  Val Asp Tyr Phe Lys  His Val Ser
    1115                1120                1125

Leu Val  Glu Thr Glu Gly Val  Phe Thr Leu Leu Asp  Asp Lys Ile
    1130                1135                1140

Met Met  Pro Gln Asp Asp Leu  Val Ile Ser Glu Ile  Asp Phe Asn
    1145                1150                1155

Asn Asn  Ser Ile Val Leu Gly  Lys Cys Glu Ile Trp  Arg Met Glu
    1160                1165                1170

Gly Gly  Ser Gly His Thr Val  Thr Asp Asp Ile Asp  His Phe Phe
    1175                1180                1185
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Ser Ala  Pro Ser Ile Thr Tyr  Arg Glu Pro His Leu  Ser Ile Tyr
    1190                1195                1200

Asp Val  Leu Glu Val Gln Lys  Glu Glu Leu Asp Leu  Ser Lys Asp
    1205                1210                1215

Leu Met  Val Leu Pro Asn Ala  Pro Asn Arg Val Phe  Ala Trp Glu
    1220                1225                1230

Thr Gly  Trp Thr Pro Gly Leu  Arg Ser Leu Glu Asn  Asp Gly Thr
    1235                1240                1245

Lys Leu  Leu Asp Arg Ile Arg  Asp Asn Tyr Glu Gly  Glu Phe Tyr
    1250                1255                1260

Trp Arg  Tyr Phe Ala Phe Ile  Ala Asp Ala Leu Ile  Thr Thr Leu
    1265                1270                1275

Lys Pro  Arg Tyr Glu Asp Thr  Asn Ile Arg Ile Asn  Leu Asp Ser
    1280                1285                1290

Asn Thr  Arg Ser Phe Ile Val  Pro Ile Ile Thr Thr  Glu Tyr Ile
    1295                1300                1305

Arg Glu  Lys Leu Ser Tyr Ser  Phe Tyr Gly Ser Gly  Gly Thr Tyr
    1310                1315                1320

Ala Leu  Ser Leu Ser Gln Tyr  Asn Met Gly Ile Asn  Ile Glu Leu
    1325                1330                1335

Ser Glu  Ser Asp Val Trp Ile  Ile Asp Val Asp Asn  Val Val Arg
    1340                1345                1350

Asp Val  Thr Ile Glu Ser Asp  Lys Ile Lys Lys Gly  Asp Leu Ile
    1355                1360                1365

Glu Gly  Ile Leu Ser Thr Leu  Ser Ile Glu Glu Asn  Lys Ile Ile
    1370                1375                1380
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Leu Asn  Ser His Glu Ile Asn  Phe Ser Gly Glu Val  Asn Gly Ser
    1385                1390                1395

Asn Gly  Phe Val Ser Leu Thr  Phe Ser Ile Leu Glu  Gly Ile Asn
    1400                1405                1410

Ala Ile  Ile Glu Val Asp Leu  Leu Ser Lys Ser Tyr  Lys Leu Leu
    1415                1420                1425

Ile Ser  Gly Glu Leu Lys Ile  Leu Met Leu Asn Ser  Asn His Ile
    1430                1435                1440

Gln Gln  Lys Ile Asp Tyr Ile  Gly Phe Asn Ser Glu  Leu Gln Lys
    1445                1450                1455

Asn Ile  Pro Tyr Ser Phe Val  Asp Ser Glu Gly Lys  Glu Asn Gly
    1460                1465                1470

Phe Ile  Asn Gly Ser Thr Lys  Glu Gly Leu Phe Val  Ser Glu Leu
    1475                1480                1485

Pro Asp  Val Val Leu Ile Ser  Lys Val Tyr Met Asp  Asp Ser Lys
    1490                1495                1500

Pro Ser  Phe Gly Tyr Tyr Ser  Asn Asn Leu Lys Asp  Val Lys Val
    1505                1510                1515

Ile Thr  Lys Asp Asn Val Asn  Ile Leu Thr Gly Tyr  Tyr Leu Lys
    1520                1525                1530

Asp Asp  Ile Lys Ile Ser Leu  Ser Leu Thr Leu Gln  Asp Glu Lys
    1535                1540                1545

Thr Ile  Lys Leu Asn Ser Val  His Leu Asp Glu Ser  Gly Val Ala
    1550                1555                1560

Glu Ile  Leu Lys Phe Met Asn  Arg Lys Gly Ser Thr  Asn Thr Ser
    1565                1570                1575
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Asp Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile
1580 1585 1590

Phe Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala
1595 1600 1605

Asn Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe
1610 1615 1620

Ile Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe
1625 1630 1635

Asn Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln
1640 1645 1650

Asn Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp
1655 1660 1665

Ile Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly
1670 1675 1680

Ile Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr
1685 1690 1695

Thr Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr
1700 1705 1710

Tyr Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys
1715 1720 1725

Ile Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser
1730 1735 1740

Asn Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn
1745 1750 1755

Lys Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp
1760 1765 1770

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Lys Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln
1775 1780 1785

Asp Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr
1790 1795 1800

Tyr Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu
1805 1810 1815

Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser
1820 1825 1830

Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro
1835 1840 1845

Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys
1850 1855 1860

Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu
1865 1870 1875

Thr Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val
1880 1885 1890

Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
1895 1900 1905

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile
1910 1915 1920

Asp Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe
1925 1930 1935

Asp Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly
1940 1945 1950

Glu Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly
1955 1960 1965

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Leu Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly
1970 1975 1980

Val Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr
1985 1990 1995

Phe Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp
2000 2005 2010

Gly Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly
2015 2020 2025

Val Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn
2030 2035 2040

Glu Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly
2045 2050 2055

Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe
2060 2065 2070

Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr
2075 2080 2085

Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu
2090 2095 2100

Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln
2105 2110 2115

Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp
2120 2125 2130

Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
2135 2140 2145

Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp
2150 2155 2160

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Thr Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn
2165 2170 2175

Asp Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg
2180 2185 2190

Val Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu
2195 2200 2205

Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile
2225 2230 2235

Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr
2240 2245 2250

Gly Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn
2255 2260 2265

Gly Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe
2270 2275 2280

Tyr Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr
2285 2290 2295

Pro Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu
2300 2305 2310

Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu
2315 2320 2325

Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr
2330 2335 2340

Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp
2345 2350 2355

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Thr Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 146
<211> 2366
<212> PRT
<213> Clostridium difficile

<400> 146

Met Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg
1 5 10 15

Phe Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
20 25 30

Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
35 40 45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
50 55 60

Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65 70 75 80

Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys
85 90 95

Asn Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
100 105 110

Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
115 120 125

Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
130 135 140

Val Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145 150 155 160

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Leu Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met
                165                 170                 175

Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala
            180                 185                 190

Gln Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr
        195                 200                 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr
    210                 215                 220

Ile Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val
225                 230                 235                 240

Arg Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu
                245                 250                 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu
            260                 265                 270

Arg Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp
        275                 280                 285

Met Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro
    290                 295                 300

Ser Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile
305                 310                 315                 320

Met Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp
                325                 330                 335

Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
            340                 345                 350

Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala
        355                 360                 365
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Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn
    370                 375                 380

Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val
385                 390                 395                 400

Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro
                405                 410                 415

Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile
            420                 425                 430

Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met
        435                 440                 445

Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr
    450                 455                 460

Thr Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp
465                 470                 475                 480

Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala
                485                 490                 495

Asp Leu Arg Asn Phe Glu Ile Phe Lys Thr Asn Ile Ser Gln Ser Thr
            500                 505                 510

Glu Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ser Arg Ala Lys
        515                 520                 525

Ala Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly
    530                 535                 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu
545                 550                 555                 560

Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly
                565                 570                 575
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Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
            580                 585                 590

Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe
        595                 600                 605

Gln Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly
    610                 615                 620

Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile
625                 630                 635                 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp
                645                 650                 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser
            660                 665                 670

Thr Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro
        675                 680                 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser
    690                 695                 700

Ile Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys
705                 710                 715                 720

Asp Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
                725                 730                 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg
            740                 745                 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
        755                 760                 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
    770                 775                 780
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Asn Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785                 790                 795                 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu
                805                 810                 815

Glu Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
            820                 825                 830

Asp Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr
        835                 840                 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser
    850                 855                 860

Ile Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp
865                 870                 875                 880

Ser His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe
                885                 890                 895

Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
            900                 905                 910

Thr Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu
        915                 920                 925

Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
    930                 935                 940

Val Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn
945                 950                 955                 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu
                965                 970                 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
            980                 985                 990
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Leu Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp Ala Ala Lys Val Val
995 1000 1005

Glu Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu Pro
1010 1015 1020

Thr Leu Ser Glu Gly Leu Pro Ile Ile Ala Thr Ile Ile Asp Gly
1025 1030 1035

Val Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp
1040 1045 1050

Pro Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala
1055 1060 1065

Val Asn Leu Thr Thr Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu
1070 1075 1080

Gly Val Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly
1085 1090 1095

Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu
1100 1105 1110

Arg Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Val Ser
1115 1120 1125

Leu Val Glu Thr Glu Gly Val Phe Thr Leu Leu Asp Asp Lys Ile
1130 1135 1140

Met Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn
1145 1150 1155

Asn Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu
1160 1165 1170

Gly Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe
1175 1180 1185

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Ser Ala  Pro Ser Ile Thr Tyr  Arg Glu Pro His Leu  Ser Ile Tyr
    1190                1195                1200

Asp Val  Leu Glu Val Gln Lys  Glu Glu Leu Asp Leu  Ser Lys Asp
    1205                1210                1215

Leu Met  Val Leu Pro Asn Ala  Pro Asn Arg Val Phe  Ala Trp Glu
    1220                1225                1230

Thr Gly  Trp Thr Pro Gly Leu  Arg Ser Leu Glu Asn  Asp Gly Thr
    1235                1240                1245

Lys Leu  Leu Asp Arg Ile Arg  Asp Asn Tyr Glu Gly  Glu Phe Tyr
    1250                1255                1260

Trp Arg  Tyr Phe Ala Phe Ile  Ala Asp Ala Leu Ile  Thr Thr Leu
    1265                1270                1275

Lys Pro  Arg Tyr Glu Asp Thr  Asn Ile Arg Ile Asn  Leu Asp Ser
    1280                1285                1290

Asn Thr  Arg Ser Phe Ile Val  Pro Ile Ile Thr Thr  Glu Tyr Ile
    1295                1300                1305

Arg Glu  Lys Leu Ser Tyr Ser  Phe Tyr Gly Ser Gly  Gly Thr Tyr
    1310                1315                1320

Ala Leu  Ser Leu Ser Gln Tyr  Asn Met Gly Ile Asn  Ile Glu Leu
    1325                1330                1335

Ser Glu  Ser Asp Val Trp Ile  Ile Asp Val Asp Asn  Val Val Arg
    1340                1345                1350

Asp Val  Thr Ile Glu Ser Asp  Lys Ile Lys Lys Gly  Asp Leu Ile
    1355                1360                1365

Glu Gly  Ile Leu Ser Thr Leu  Ser Ile Glu Glu Asn  Lys Ile Ile
    1370                1375                1380
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Leu Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser
1385 1390 1395

Asn Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn
1400 1405 1410

Ala Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu
1415 1420 1425

Ile Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile
1430 1435 1440

Gln Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys
1445 1450 1455

Asn Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly
1460 1465 1470

Phe Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu
1475 1480 1485

Pro Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys
1490 1495 1500

Pro Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val
1505 1510 1515

Ile Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys
1520 1525 1530

Asp Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys
1535 1540 1545

Thr Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala
1550 1555 1560

Glu Ile Leu Lys Phe Met Asn Arg Lys Gly Ser Thr Asn Thr Ser
1565 1570 1575

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Asp Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile
1580 1585 1590

Phe Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala
1595 1600 1605

Asn Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe
1610 1615 1620

Ile Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe
1625 1630 1635

Asn Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln
1640 1645 1650

Asn Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp
1655 1660 1665

Ile Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly
1670 1675 1680

Ile Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr
1685 1690 1695

Thr Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr
1700 1705 1710

Tyr Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys
1715 1720 1725

Ile Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser
1730 1735 1740

Asn Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn
1745 1750 1755

Lys Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp
1760 1765 1770

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Lys Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln
1775 1780 1785

Asp Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr
1790 1795 1800

Tyr Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu
1805 1810 1815

Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser
1820 1825 1830

Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro
1835 1840 1845

Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys
1850 1855 1860

Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu
1865 1870 1875

Thr Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val
1880 1885 1890

Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
1895 1900 1905

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile
1910 1915 1920

Asp Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe
1925 1930 1935

Asp Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly
1940 1945 1950

Glu Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly
1955 1960 1965

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Leu Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly
1970 1975 1980

Val Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr
1985 1990 1995

Phe Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp
2000 2005 2010

Gly Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly
2015 2020 2025

Val Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn
2030 2035 2040

Glu Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly
2045 2050 2055

Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe
2060 2065 2070

Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr
2075 2080 2085

Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu
2090 2095 2100

Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln
2105 2110 2115

Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp
2120 2125 2130

Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
2135 2140 2145

Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp
2150 2155 2160

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Thr Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn
2165 2170 2175

Asp Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg
2180 2185 2190

Val Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu
2195 2200 2205

Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile
2225 2230 2235

Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr
2240 2245 2250

Gly Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn
2255 2260 2265

Gly Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe
2270 2275 2280

Tyr Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr
2285 2290 2295

Pro Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu
2300 2305 2310

Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu
2315 2320 2325

Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr
2330 2335 2340

Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp
2345 2350 2355

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Thr Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 147
<211> 2366
<212> PRT
<213> Clostridium difficile

<400> 147

Met Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg
1 5 10 15

Phe Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
20 25 30

Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
35 40 45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
50 55 60

Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65 70 75 80

Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys
85 90 95

Asn Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
100 105 110

Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
115 120 125

Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
130 135 140

Val Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145 150 155 160

```
Leu Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met
                165                 170                 175

Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala
            180                 185                 190

Gln Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr
        195                 200                 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr
    210                 215                 220

Ile Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val
225                 230                 235                 240

Arg Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu
                245                 250                 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu
            260                 265                 270

Arg Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp
        275                 280                 285

Met Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro
    290                 295                 300

Ser Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile
305                 310                 315                 320

Met Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp
                325                 330                 335

Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
            340                 345                 350

Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala
        355                 360                 365
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Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn
    370                 375                 380

Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val
385                 390                 395                 400

Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro
                405                 410                 415

Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile
            420                 425                 430

Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met
        435                 440                 445

Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr
    450                 455                 460

Thr Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp
465                 470                 475                 480

Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala
                485                 490                 495

Asp Leu Arg Asn Phe Glu Ile Phe Lys Thr Asn Ile Ser Gln Ser Thr
            500                 505                 510

Glu Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ser Arg Ala Lys
        515                 520                 525

Ala Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly
    530                 535                 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu
545                 550                 555                 560

Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly
                565                 570                 575
```

```
Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
            580                 585                 590

Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe
        595                 600                 605

Gln Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly
    610                 615                 620

Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile
625                 630                 635                 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp
                645                 650                 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser
            660                 665                 670

Thr Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro
        675                 680                 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser
    690                 695                 700

Ile Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys
705                 710                 715                 720

Asp Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
                725                 730                 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg
            740                 745                 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
        755                 760                 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
    770                 775                 780
```

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```
Asn Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785                 790                 795                 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu
                805                 810                 815

Glu Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
            820                 825                 830

Asp Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr
        835                 840                 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser
    850                 855                 860

Ile Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp
865                 870                 875                 880

Ser His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe
                885                 890                 895

Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
            900                 905                 910

Thr Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu
        915                 920                 925

Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
    930                 935                 940

Val Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn
945                 950                 955                 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu
                965                 970                 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
            980                 985                 990
```

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```
Leu Phe Ser Thr Gly Leu Asn Thr  Ile Thr Asp Ala Ala  Lys Val Val
        995                 1000                1005

Glu Leu  Val Ser Thr Ala Leu  Asp Glu Thr Ile Asp  Leu Leu Pro
    1010                1015                1020

Thr Leu  Ser Glu Gly Leu Pro  Ile Ile Ala Thr Ile  Ile Asp Gly
    1025                1030                1035

Val Ser  Leu Gly Ala Ala Ile  Lys Glu Leu Ser Glu  Thr Ser Asp
    1040                1045                1050

Pro Leu  Leu Arg Gln Glu Ile  Glu Ala Lys Ile Gly  Ile Met Ala
    1055                1060                1065

Val Asn  Leu Thr Thr Ala Thr  Thr Ala Ile Ile Thr  Ser Ser Leu
    1070                1075                1080

Gly Val  Ala Ser Gly Phe Ser  Ile Leu Leu Val Pro  Leu Ala Gly
    1085                1090                1095

Ile Ser  Ala Gly Ile Pro Ser  Leu Val Asn Asn Glu  Leu Val Leu
    1100                1105                1110

Arg Asp  Lys Ala Thr Lys Val  Val Asp Tyr Phe Lys  His Val Ser
    1115                1120                1125

Leu Val  Glu Thr Glu Gly Val  Phe Thr Leu Leu Asp  Asp Lys Ile
    1130                1135                1140

Met Met  Pro Gln Asp Asp Leu  Val Ile Ser Glu Ile  Asp Phe Asn
    1145                1150                1155

Asn Asn  Ser Ile Val Leu Gly  Lys Cys Glu Ile Trp  Arg Met Glu
    1160                1165                1170

Gly Gly  Ser Gly His Thr Val  Thr Asp Asp Ile Asp  His Phe Phe
    1175                1180                1185
```

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Ser Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr
1190 1195 1200

Asp Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp
1205 1210 1215

Leu Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu
1220 1225 1230

Thr Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr
1235 1240 1245

Lys Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr
1250 1255 1260

Trp Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu
1265 1270 1275

Lys Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser
1280 1285 1290

Asn Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile
1295 1300 1305

Arg Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr
1310 1315 1320

Ala Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu
1325 1330 1335

Ser Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg
1340 1345 1350

Asp Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile
1355 1360 1365

Glu Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile
1370 1375 1380

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```
Leu Asn  Ser His Glu Ile Asn  Phe Ser Gly Glu Val  Asn Gly Ser
    1385                1390                1395

Asn Gly  Phe Val Ser Leu Thr  Phe Ser Ile Leu Glu  Gly Ile Asn
    1400                1405                1410

Ala Ile  Ile Glu Val Asp Leu  Leu Ser Lys Ser Tyr  Lys Leu Leu
    1415                1420                1425

Ile Ser  Gly Glu Leu Lys Ile  Leu Met Leu Asn Ser  Asn His Ile
    1430                1435                1440

Gln Gln  Lys Ile Asp Tyr Ile  Gly Phe Asn Ser Glu  Leu Gln Lys
    1445                1450                1455

Asn Ile  Pro Tyr Ser Phe Val  Asp Ser Glu Gly Lys  Glu Asn Gly
    1460                1465                1470

Phe Ile  Asn Gly Ser Thr Lys  Glu Gly Leu Phe Val  Ser Glu Leu
    1475                1480                1485

Pro Asp  Val Val Leu Ile Ser  Lys Val Tyr Met Asp  Asp Ser Lys
    1490                1495                1500

Pro Ser  Phe Gly Tyr Tyr Ser  Asn Asn Leu Lys Asp  Val Lys Val
    1505                1510                1515

Ile Thr  Lys Asp Asn Val Asn  Ile Leu Thr Gly Tyr  Tyr Leu Lys
    1520                1525                1530

Asp Asp  Ile Lys Ile Ser Leu  Ser Leu Thr Leu Gln  Asp Glu Lys
    1535                1540                1545

Thr Ile  Lys Leu Asn Ser Val  His Leu Asp Glu Ser  Gly Val Ala
    1550                1555                1560

Glu Ile  Leu Lys Phe Met Asn  Arg Lys Gly Ser Thr  Asn Thr Ser
    1565                1570                1575
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Asp Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile
1580 1585 1590

Phe Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala
1595 1600 1605

Asn Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe
1610 1615 1620

Ile Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe
1625 1630 1635

Asn Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln
1640 1645 1650

Asn Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp
1655 1660 1665

Ile Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly
1670 1675 1680

Ile Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr
1685 1690 1695

Thr Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr
1700 1705 1710

Tyr Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys
1715 1720 1725

Ile Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser
1730 1735 1740

Asn Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn
1745 1750 1755

Lys Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp
1760 1765 1770

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Lys Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln
1775 1780 1785

Asp Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr
1790 1795 1800

Tyr Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu
1805 1810 1815

Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser
1820 1825 1830

Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro
1835 1840 1845

Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys
1850 1855 1860

Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu
1865 1870 1875

Thr Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val
1880 1885 1890

Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
1895 1900 1905

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile
1910 1915 1920

Asp Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe
1925 1930 1935

Asp Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly
1940 1945 1950

Glu Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly
1955 1960 1965

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```
Leu Asn  Gln Ile Gly Asp Asp  Lys Tyr Tyr Phe Asn  Ser Asp Gly
    1970                1975                1980

Val Met  Gln Lys Gly Phe Val  Ser Ile Asn Asp Asn  Lys His Tyr
    1985                1990                1995

Phe Asp  Asp Ser Gly Val Met  Lys Val Gly Tyr Thr  Glu Ile Asp
    2000                2005                2010

Gly Lys  His Phe Tyr Phe Ala  Glu Asn Gly Glu Met  Gln Ile Gly
    2015                2020                2025

Val Phe  Asn Thr Glu Asp Gly  Phe Lys Tyr Phe Ala  His His Asn
    2030                2035                2040

Glu Asp  Leu Gly Asn Glu Glu  Gly Glu Glu Ile Ser  Tyr Ser Gly
    2045                2050                2055

Ile Leu  Asn Phe Asn Asn Lys  Ile Tyr Tyr Phe Asp  Asp Ser Phe
    2060                2065                2070

Thr Ala  Val Val Gly Trp Lys  Asp Leu Glu Asp Gly  Ser Lys Tyr
    2075                2080                2085

Tyr Phe  Asp Glu Asp Thr Ala  Glu Ala Tyr Ile Gly  Leu Ser Leu
    2090                2095                2100

Ile Asn  Asp Gly Gln Tyr Tyr  Phe Asn Asp Asp Gly  Ile Met Gln
    2105                2110                2115

Val Gly  Phe Val Thr Ile Asn  Asp Lys Val Phe Tyr  Phe Ser Asp
    2120                2125                2130

Ser Gly  Ile Ile Glu Ser Gly  Val Gln Asn Ile Asp  Asp Asn Tyr
    2135                2140                2145

Phe Tyr  Ile Asp Asp Asn Gly  Ile Val Gln Ile Gly  Val Phe Asp
    2150                2155                2160
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```
Thr Ser  Asp Gly Tyr Lys Tyr  Phe Ala Pro Ala Asn  Thr Val Asn
    2165                2170                2175

Asp Asn  Ile Tyr Gly Gln Ala  Val Glu Tyr Ser Gly  Leu Val Arg
    2180                2185                2190

Val Gly  Glu Asp Val Tyr Tyr  Phe Gly Glu Thr Tyr  Thr Ile Glu
    2195                2200                2205

Thr Gly  Trp Ile Tyr Asp Met  Glu Asn Glu Ser Asp  Lys Tyr Tyr
    2210                2215                2220

Phe Asn  Pro Glu Thr Lys Lys  Ala Cys Lys Gly Ile  Asn Leu Ile
    2225                2230                2235

Asp Asp  Ile Lys Tyr Tyr Phe  Asp Glu Lys Gly Ile  Met Arg Thr
    2240                2245                2250

Gly Leu  Ile Ser Phe Glu Asn  Asn Asn Tyr Tyr Phe  Asn Glu Asn
    2255                2260                2265

Gly Glu  Met Gln Phe Gly Tyr  Ile Asn Ile Glu Asp  Lys Met Phe
    2270                2275                2280

Tyr Phe  Gly Glu Asp Gly Val  Met Gln Ile Gly Val  Phe Asn Thr
    2285                2290                2295

Pro Asp  Gly Phe Lys Tyr Phe  Ala His Gln Asn Thr  Leu Asp Glu
    2300                2305                2310

Asn Phe  Glu Gly Glu Ser Ile  Asn Tyr Thr Gly Trp  Leu Asp Leu
    2315                2320                2325

Asp Glu  Lys Arg Tyr Tyr Phe  Thr Asp Glu Tyr Ile  Ala Ala Thr
    2330                2335                2340

Gly Ser  Val Ile Ile Asp Gly  Glu Glu Tyr Tyr Phe  Asp Pro Asp
    2345                2350                2355
```

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Thr Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 148
<211> 2710
<212> PRT
<213> Clostridium difficile

<400> 148

Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1 5 10 15

Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
20 25 30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
35 40 45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr
50 55 60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65 70 75 80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
100 105 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
115 120 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
130 135 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145 150 155 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu

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                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
    290                 295                 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
                325                 330                 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
            340                 345                 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
        355                 360                 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
```

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370 375 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385 390 395 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
405 410 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
420 425 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
435 440 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
450 455 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465 470 475 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
485 490 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
500 505 510

Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
515 520 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
530 535 540

Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545 550 555 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
565 570 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser

```
            580                 585                 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
        595                 600                 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
    610                 615                 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625                 630                 635                 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
                645                 650                 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
            660                 665                 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
        675                 680                 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
    690                 695                 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705                 710                 715                 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser
                725                 730                 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
            740                 745                 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
        755                 760                 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
    770                 775                 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
```

785 790 795 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
805 810 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
820 825 830

Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
835 840 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
850 855 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865 870 875 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
885 890 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
900 905 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
915 920 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
930 935 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945 950 955 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
965 970 975

Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
980 985 990

Ala Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln

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995 1000 1005

Leu Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val
1010 1015 1020

Leu Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu
1025 1030 1035

Asp Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu
1040 1045 1050

His Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val
1055 1060 1065

Leu Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser
1070 1075 1080

Ile Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile
1085 1090 1095

Ala Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu
1100 1105 1110

Ile Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His
1115 1120 1125

Leu Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp
1130 1135 1140

Lys Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp
1145 1150 1155

Phe Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala
1160 1165 1170

Met Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His
1175 1180 1185

Phe Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser

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1190 1195 1200

Ile Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser
1205 1210 1215

Lys Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp
1220 1225 1230

Trp Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp
1235 1240 1245

Gly Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys
1250 1255 1260

Phe Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr
1265 1270 1275

Leu Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp
1280 1285 1290

Lys Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu
1295 1300 1305

Ile Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr
1310 1315 1320

Tyr Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn
1325 1330 1335

Leu Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val
1340 1345 1350

Arg Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu
1355 1360 1365

Ile Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu
1370 1375 1380

Ile Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn

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1385 1390 1395

Lys Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile
1400 1405 1410

Ser Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu
1415 1420 1425

Leu Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn
1430 1435 1440

Thr Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile
1445 1450 1455

Ala Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala
1460 1465 1470

Ile Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp
1475 1480 1485

Ser Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe
1490 1495 1500

Asn Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys
1505 1510 1515

Asp Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn
1520 1525 1530

Thr Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn
1535 1540 1545

Gln Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser
1550 1555 1560

Ser Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr
1565 1570 1575

Ser Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys

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1580 1585 1590

Leu Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe
1595 1600 1605

Thr Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys
1610 1615 1620

Asp Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr
1625 1630 1635

Ser Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val
1640 1645 1650

Val Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser
1655 1660 1665

Thr Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg
1670 1675 1680

Tyr Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu
1685 1690 1695

Ile Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu
1700 1705 1710

Ile Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile
1715 1720 1725

Asn Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly
1730 1735 1740

Ser Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys
1745 1750 1755

Ile Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln
1760 1765 1770

Ser Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu

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1775 1780 1785

Ser Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu
1790 1795 1800

Asn Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn
1805 1810 1815

Lys Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu
1820 1825 1830

Ile Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe
1835 1840 1845

Asn Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr
1850 1855 1860

Phe Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile
1865 1870 1875

Asn Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu
1880 1885 1890

Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala
1895 1900 1905

Asn Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln
1910 1915 1920

Ser Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn
1925 1930 1935

Asp Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys
1940 1945 1950

Tyr Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln
1955 1960 1965

Val Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile

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1970 1975 1980

Ile Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe
1985 1990 1995

Asp Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp
2000 2005 2010

Gly Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly
2015 2020 2025

Val Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2030 2035 2040

Thr Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
2045 2050 2055

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
2060 2065 2070

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr
2075 2080 2085

Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr
2090 2095 2100

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala
2105 2110 2115

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2120 2125 2130

Thr Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
2135 2140 2145

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2150 2155 2160

Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr

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2165 2170 2175

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu
2180 2185 2190

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser
2195 2200 2205

Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile
2225 2230 2235

Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn
2240 2245 2250

Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn
2255 2260 2265

Asn Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly
2270 2275 2280

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu
2285 2290 2295

Gly Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly
2300 2305 2310

Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp
2315 2320 2325

Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala
2330 2335 2340

Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr
2345 2350 2355

Phe Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile

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2360 2365 2370

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser
2375 2380 2385

Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr
2390 2395 2400

Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe
2405 2410 2415

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2420 2425 2430

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2435 2440 2445

Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg
2450 2455 2460

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val
2465 2470 2475

Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
2480 2485 2490

Asn Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser
2495 2500 2505

Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly
2510 2515 2520

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2525 2530 2535

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2540 2545 2550

Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn

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2555 2560 2565

Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr
2570 2575 2580

Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr
2585 2590 2595

Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile
2600 2605 2610

Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala
2615 2620 2625

Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln
2630 2635 2640

Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly
2705 2710

<210> 149
<211> 2710
<212> PRT
<213> Clostridium difficile

<400> 149

Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1 5 10 15

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```
Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
            20                  25                  30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
        35                  40                  45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr
    50                  55                  60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65                  70                  75                  80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
            100                 105                 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
        115                 120                 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
    130                 135                 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg
    210                 215                 220
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Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
    290                 295                 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
                325                 330                 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
            340                 345                 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
        355                 360                 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
    370                 375                 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385                 390                 395                 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
                405                 410                 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
            420                 425                 430
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```
Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
        435                 440                 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
    450                 455                 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465                 470                 475                 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
                485                 490                 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
            500                 505                 510

Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
        515                 520                 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
    530                 535                 540

Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545                 550                 555                 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
                565                 570                 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
            580                 585                 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
        595                 600                 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
    610                 615                 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625                 630                 635                 640
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Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
645 650 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
660 665 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
675 680 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
690 695 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705 710 715 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser
725 730 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
740 745 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
755 760 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
770 775 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785 790 795 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
805 810 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
820 825 830

Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
835 840 845

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```
Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
    850                 855                 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865                 870                 875                 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
                885                 890                 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
            900                 905                 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
        915                 920                 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
    930                 935                 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945                 950                 955                 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
                965                 970                 975

Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
            980                 985                 990

Ala Gln Leu Phe Ser Thr Gly Leu  Asn Thr Ile Tyr Asp  Ser Ile Gln
        995                 1000                1005

Leu Val  Asn Leu Ile Ser Asn  Ala Val Asn Asp Thr  Ile Asn Val
    1010                1015                1020

Leu Pro  Thr Ile Thr Glu Gly  Ile Pro Ile Val Ser  Thr Ile Leu
    1025                1030                1035

Asp Gly  Ile Asn Leu Gly Ala  Ala Ile Lys Glu Leu  Leu Asp Glu
    1040                1045                1050
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```
His Asp  Pro Leu Leu Lys Lys  Glu Leu Glu Ala Lys  Val Gly Val
    1055                1060                1065

Leu Ala  Ile Asn Met Ser Leu  Ser Ile Ala Ala Thr  Val Ala Ser
    1070                1075                1080

Ile Val  Gly Ile Gly Ala Glu  Val Thr Ile Phe Leu  Leu Pro Ile
    1085                1090                1095

Ala Gly  Ile Ser Ala Gly Ile  Pro Ser Leu Val Asn  Asn Glu Leu
    1100                1105                1110

Ile Leu  His Asp Lys Ala Thr  Ser Val Val Asn Tyr  Phe Asn His
    1115                1120                1125

Leu Ser  Glu Ser Lys Lys Tyr  Gly Pro Leu Lys Thr  Glu Asp Asp
    1130                1135                1140

Lys Ile  Leu Val Pro Ile Asp  Asp Leu Val Ile Ser  Glu Ile Asp
    1145                1150                1155

Phe Asn  Asn Asn Ser Ile Lys  Leu Gly Thr Cys Asn  Ile Leu Ala
    1160                1165                1170

Met Glu  Gly Gly Ser Gly His  Thr Val Thr Gly Asn  Ile Asp His
    1175                1180                1185

Phe Phe  Ser Ser Pro Ser Ile  Ser Ser His Ile Pro  Ser Leu Ser
    1190                1195                1200

Ile Tyr  Ser Ala Ile Gly Ile  Glu Thr Glu Asn Leu  Asp Phe Ser
    1205                1210                1215

Lys Lys  Ile Met Met Leu Pro  Asn Ala Pro Ser Arg  Val Phe Trp
    1220                1225                1230

Trp Glu  Thr Gly Ala Val Pro  Gly Leu Arg Ser Leu  Glu Asn Asp
    1235                1240                1245
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```
Gly Thr  Arg Leu Leu Asp Ser  Ile Arg Asp Leu Tyr  Pro Gly Lys
    1250                1255                1260

Phe Tyr  Trp Arg Phe Tyr Ala  Phe Phe Asp Tyr Ala  Ile Thr Thr
    1265                1270                1275

Leu Lys  Pro Val Tyr Glu Asp  Thr Asn Ile Lys Ile  Lys Leu Asp
    1280                1285                1290

Lys Asp  Thr Arg Asn Phe Ile  Met Pro Thr Ile Thr  Thr Asn Glu
    1295                1300                1305

Ile Arg  Asn Lys Leu Ser Tyr  Ser Phe Asp Gly Ala  Gly Gly Thr
    1310                1315                1320

Tyr Ser  Leu Leu Leu Ser Ser  Tyr Pro Ile Ser Thr  Asn Ile Asn
    1325                1330                1335

Leu Ser  Lys Asp Asp Leu Trp  Ile Phe Asn Ile Asp  Asn Glu Val
    1340                1345                1350

Arg Glu  Ile Ser Ile Glu Asn  Gly Thr Ile Lys Lys  Gly Lys Leu
    1355                1360                1365

Ile Lys  Asp Val Leu Ser Lys  Ile Asp Ile Asn Lys  Asn Lys Leu
    1370                1375                1380

Ile Ile  Gly Asn Gln Thr Ile  Asp Phe Ser Gly Asp  Ile Asp Asn
    1385                1390                1395

Lys Asp  Arg Tyr Ile Phe Leu  Thr Cys Glu Leu Asp  Asp Lys Ile
    1400                1405                1410

Ser Leu  Ile Ile Glu Ile Asn  Leu Val Ala Lys Ser  Tyr Ser Leu
    1415                1420                1425

Leu Leu  Ser Gly Asp Lys Asn  Tyr Leu Ile Ser Asn  Leu Ser Asn
    1430                1435                1440
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Thr Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile
1445 1450 1455

Ala Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala
1460 1465 1470

Ile Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp
1475 1480 1485

Ser Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe
1490 1495 1500

Asn Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys
1505 1510 1515

Asp Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn
1520 1525 1530

Thr Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn
1535 1540 1545

Gln Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser
1550 1555 1560

Ser Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr
1565 1570 1575

Ser Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys
1580 1585 1590

Leu Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe
1595 1600 1605

Thr Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys
1610 1615 1620

Asp Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr
1625 1630 1635

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```
Ser Ser  Ser Lys Ser Thr Ile  Phe Ser Gly Asn Gly  Arg Asn Val
    1640                1645                1650

Val Val  Glu Pro Ile Tyr Asn  Pro Asp Thr Gly Glu  Asp Ile Ser
    1655                1660                1665

Thr Ser  Leu Asp Phe Ser Tyr  Glu Pro Leu Tyr Gly  Ile Asp Arg
    1670                1675                1680

Tyr Ile  Asn Lys Val Leu Ile  Ala Pro Asp Leu Tyr  Thr Ser Leu
    1685                1690                1695

Ile Asn  Ile Asn Thr Asn Tyr  Tyr Ser Asn Glu Tyr  Tyr Pro Glu
    1700                1705                1710

Ile Ile  Val Leu Asn Pro Asn  Thr Phe His Lys Lys  Val Asn Ile
    1715                1720                1725

Asn Leu  Asp Ser Ser Ser Phe  Glu Tyr Lys Trp Ser  Thr Glu Gly
    1730                1735                1740

Ser Asp  Phe Ile Leu Val Arg  Tyr Leu Glu Glu Ser  Asn Lys Lys
    1745                1750                1755

Ile Leu  Gln Lys Ile Arg Ile  Lys Gly Ile Leu Ser  Asn Thr Gln
    1760                1765                1770

Ser Phe  Asn Lys Met Ser Ile  Asp Phe Lys Asp Ile  Lys Lys Leu
    1775                1780                1785

Ser Leu  Gly Tyr Ile Met Ser  Asn Phe Lys Ser Phe  Asn Ser Glu
    1790                1795                1800

Asn Glu  Leu Asp Arg Asp His  Leu Gly Phe Lys Ile  Ile Asp Asn
    1805                1810                1815

Lys Thr  Tyr Tyr Tyr Asp Glu  Asp Ser Lys Leu Val  Lys Gly Leu
    1820                1825                1830
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```
Ile Asn  Ile Asn Asn Ser Leu  Phe Tyr Phe Asp Pro  Ile Glu Phe
    1835                1840                1845

Asn Leu  Val Thr Gly Trp Gln  Thr Ile Asn Gly Lys  Lys Tyr Tyr
    1850                1855                1860

Phe Asp  Ile Asn Thr Gly Ala  Ala Leu Thr Ser Tyr  Lys Ile Ile
    1865                1870                1875

Asn Gly  Lys His Phe Tyr Phe  Asn Asn Asp Gly Val  Met Gln Leu
    1880                1885                1890

Gly Val  Phe Lys Gly Pro Asp  Gly Phe Glu Tyr Phe  Ala Pro Ala
    1895                1900                1905

Asn Thr  Gln Asn Asn Asn Ile  Glu Gly Gln Ala Ile  Val Tyr Gln
    1910                1915                1920

Ser Lys  Phe Leu Thr Leu Asn  Gly Lys Lys Tyr Tyr  Phe Asp Asn
    1925                1930                1935

Asp Ser  Lys Ala Val Thr Gly  Trp Arg Ile Ile Asn  Asn Glu Lys
    1940                1945                1950

Tyr Tyr  Phe Asn Pro Asn Asn  Ala Ile Ala Ala Val  Gly Leu Gln
    1955                1960                1965

Val Ile  Asp Asn Asn Lys Tyr  Tyr Phe Asn Pro Asp  Thr Ala Ile
    1970                1975                1980

Ile Ser  Lys Gly Trp Gln Thr  Val Asn Gly Ser Arg  Tyr Tyr Phe
    1985                1990                1995

Asp Thr  Asp Thr Ala Ile Ala  Phe Asn Gly Tyr Lys  Thr Ile Asp
    2000                2005                2010

Gly Lys  His Phe Tyr Phe Asp  Ser Asp Cys Val Val  Lys Ile Gly
    2015                2020                2025
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Val Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2030 2035 2040

Thr Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
2045 2050 2055

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
2060 2065 2070

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr
2075 2080 2085

Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr
2090 2095 2100

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala
2105 2110 2115

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2120 2125 2130

Thr Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
2135 2140 2145

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2150 2155 2160

Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2165 2170 2175

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu
2180 2185 2190

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser
2195 2200 2205

Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr
2210 2215 2220

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Phe Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile
2225 2230 2235

Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn
2240 2245 2250

Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn
2255 2260 2265

Asn Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly
2270 2275 2280

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu
2285 2290 2295

Gly Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly
2300 2305 2310

Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp
2315 2320 2325

Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala
2330 2335 2340

Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr
2345 2350 2355

Phe Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2360 2365 2370

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser
2375 2380 2385

Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr
2390 2395 2400

Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe
2405 2410 2415

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```
Glu Tyr  Phe Ala Pro Ala Asn  Thr His Asn Asn Asn  Ile Glu Gly
    2420                2425                2430

Gln Ala  Ile Leu Tyr Gln Asn  Lys Phe Leu Thr Leu  Asn Gly Lys
    2435                2440                2445

Lys Tyr  Tyr Phe Gly Ser Asp  Ser Lys Ala Val Thr  Gly Leu Arg
    2450                2455                2460

Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn Thr Asn  Thr Ala Val
    2465                2470                2475

Ala Val  Thr Gly Trp Gln Thr  Ile Asn Gly Lys Lys  Tyr Tyr Phe
    2480                2485                2490

Asn Thr  Asn Thr Ser Ile Ala  Ser Thr Gly Tyr Thr  Ile Ile Ser
    2495                2500                2505

Gly Lys  His Phe Tyr Phe Asn  Thr Asp Gly Ile Met  Gln Ile Gly
    2510                2515                2520

Val Phe  Lys Gly Pro Asp Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2525                2530                2535

Thr Asp  Ala Asn Asn Ile Glu  Gly Gln Ala Ile Arg  Tyr Gln Asn
    2540                2545                2550

Arg Phe  Leu Tyr Leu His Asp  Asn Ile Tyr Tyr Phe  Gly Asn Asn
    2555                2560                2565

Ser Lys  Ala Ala Thr Gly Trp  Val Thr Ile Asp Gly  Asn Arg Tyr
    2570                2575                2580

Tyr Phe  Glu Pro Asn Thr Ala  Met Gly Ala Asn Gly  Tyr Lys Thr
    2585                2590                2595

Ile Asp  Asn Lys Asn Phe Tyr  Phe Arg Asn Gly Leu  Pro Gln Ile
    2600                2605                2610
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Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala
2615 2620 2625

Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln
2630 2635 2640

Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly
2705 2710

<210> 150
<211> 2710
<212> PRT
<213> Clostridium difficile

<400> 150

Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1 5 10 15

Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
20 25 30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
35 40 45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr
50 55 60

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Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65                  70                  75                  80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
            100                 105                 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
        115                 120                 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
    130                 135                 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270
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Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
275 280 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
290 295 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
325 330 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
340 345 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
355 360 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
370 375 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385 390 395 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
405 410 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
420 425 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
435 440 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
450 455 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465 470 475 480

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Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
                485                 490                 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
            500                 505                 510

Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
        515                 520                 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
    530                 535                 540

Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545                 550                 555                 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
                565                 570                 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
            580                 585                 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
        595                 600                 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
    610                 615                 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625                 630                 635                 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
                645                 650                 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
            660                 665                 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
        675                 680                 685
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```
Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
    690                 695                 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705                 710                 715                 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser
                725                 730                 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
            740                 745                 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
        755                 760                 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
    770                 775                 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785                 790                 795                 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
                805                 810                 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
            820                 825                 830

Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
        835                 840                 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
    850                 855                 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865                 870                 875                 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
                885                 890                 895
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```
Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
            900                 905                 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
        915                 920                 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
    930                 935                 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945                 950                 955                 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
                965                 970                 975

Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
            980                 985                 990

Ala Gln Leu Phe Ser Thr Gly Leu  Asn Thr Ile Tyr Asp  Ser Ile Gln
        995                 1000                1005

Leu Val  Asn Leu Ile Ser Asn  Ala Val Asn Asp Thr  Ile Asn Val
    1010                1015                1020

Leu Pro  Thr Ile Thr Glu Gly  Ile Pro Ile Val Ser  Thr Ile Leu
    1025                1030                1035

Asp Gly  Ile Asn Leu Gly Ala  Ala Ile Lys Glu Leu  Leu Asp Glu
    1040                1045                1050

His Asp  Pro Leu Leu Lys Lys  Glu Leu Glu Ala Lys  Val Gly Val
    1055                1060                1065

Leu Ala  Ile Asn Met Ser Leu  Ser Ile Ala Ala Thr  Val Ala Ser
    1070                1075                1080

Ile Val  Gly Ile Gly Ala Glu  Val Thr Ile Phe Leu  Leu Pro Ile
    1085                1090                1095
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Ala Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu
1100 1105 1110

Ile Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His
1115 1120 1125

Leu Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp
1130 1135 1140

Lys Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp
1145 1150 1155

Phe Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala
1160 1165 1170

Met Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His
1175 1180 1185

Phe Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser
1190 1195 1200

Ile Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser
1205 1210 1215

Lys Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp
1220 1225 1230

Trp Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp
1235 1240 1245

Gly Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys
1250 1255 1260

Phe Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr
1265 1270 1275

Leu Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp
1280 1285 1290

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```
Lys Asp  Thr Arg Asn Phe Ile  Met Pro Thr Ile Thr  Thr Asn Glu
    1295                1300                1305

Ile Arg  Asn Lys Leu Ser Tyr  Ser Phe Asp Gly Ala  Gly Gly Thr
    1310                1315                1320

Tyr Ser  Leu Leu Leu Ser Ser  Tyr Pro Ile Ser Thr  Asn Ile Asn
    1325                1330                1335

Leu Ser  Lys Asp Asp Leu Trp  Ile Phe Asn Ile Asp  Asn Glu Val
    1340                1345                1350

Arg Glu  Ile Ser Ile Glu Asn  Gly Thr Ile Lys Lys  Gly Lys Leu
    1355                1360                1365

Ile Lys  Asp Val Leu Ser Lys  Ile Asp Ile Asn Lys  Asn Lys Leu
    1370                1375                1380

Ile Ile  Gly Asn Gln Thr Ile  Asp Phe Ser Gly Asp  Ile Asp Asn
    1385                1390                1395

Lys Asp  Arg Tyr Ile Phe Leu  Thr Cys Glu Leu Asp  Asp Lys Ile
    1400                1405                1410

Ser Leu  Ile Ile Glu Ile Asn  Leu Val Ala Lys Ser  Tyr Ser Leu
    1415                1420                1425

Leu Leu  Ser Gly Asp Lys Asn  Tyr Leu Ile Ser Asn  Leu Ser Asn
    1430                1435                1440

Thr Ile  Glu Lys Ile Asn Thr  Leu Gly Leu Asp Ser  Lys Asn Ile
    1445                1450                1455

Ala Tyr  Asn Tyr Thr Asp Glu  Ser Asn Asn Lys Tyr  Phe Gly Ala
    1460                1465                1470

Ile Ser  Lys Thr Ser Gln Lys  Ser Ile Ile His Tyr  Lys Lys Asp
    1475                1480                1485
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```
Ser Lys  Asn Ile Leu Glu Phe  Tyr Asn Asp Ser Thr  Leu Glu Phe
    1490                1495                1500

Asn Ser  Lys Asp Phe Ile Ala  Glu Asp Ile Asn Val  Phe Met Lys
    1505                1510                1515

Asp Asp  Ile Asn Thr Ile Thr  Gly Lys Tyr Tyr Val  Asp Asn Asn
    1520                1525                1530

Thr Asp  Lys Ser Ile Asp Phe  Ser Ile Ser Leu Val  Ser Lys Asn
    1535                1540                1545

Gln Val  Lys Val Asn Gly Leu  Tyr Leu Asn Glu Ser  Val Tyr Ser
    1550                1555                1560

Ser Tyr  Leu Asp Phe Val Lys  Asn Ser Asp Gly His  His Asn Thr
    1565                1570                1575

Ser Asn  Phe Met Asn Leu Phe  Leu Asp Asn Ile Ser  Phe Trp Lys
    1580                1585                1590

Leu Phe  Gly Phe Glu Asn Ile  Asn Phe Val Ile Asp  Lys Tyr Phe
    1595                1600                1605

Thr Leu  Val Gly Lys Thr Asn  Leu Gly Tyr Val Glu  Phe Ile Cys
    1610                1615                1620

Asp Asn  Asn Lys Asn Ile Asp  Ile Tyr Phe Gly Glu  Trp Lys Thr
    1625                1630                1635

Ser Ser  Ser Lys Ser Thr Ile  Phe Ser Gly Asn Gly  Arg Asn Val
    1640                1645                1650

Val Val  Glu Pro Ile Tyr Asn  Pro Asp Thr Gly Glu  Asp Ile Ser
    1655                1660                1665

Thr Ser  Leu Asp Phe Ser Tyr  Glu Pro Leu Tyr Gly  Ile Asp Arg
    1670                1675                1680
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Tyr Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu
1685 1690 1695

Ile Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu
1700 1705 1710

Ile Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile
1715 1720 1725

Asn Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly
1730 1735 1740

Ser Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys
1745 1750 1755

Ile Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln
1760 1765 1770

Ser Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu
1775 1780 1785

Ser Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu
1790 1795 1800

Asn Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn
1805 1810 1815

Lys Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu
1820 1825 1830

Ile Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe
1835 1840 1845

Asn Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr
1850 1855 1860

Phe Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile
1865 1870 1875

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Asn Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu
1880 1885 1890

Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala
1895 1900 1905

Asn Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln
1910 1915 1920

Ser Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn
1925 1930 1935

Asp Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys
1940 1945 1950

Tyr Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln
1955 1960 1965

Val Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile
1970 1975 1980

Ile Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe
1985 1990 1995

Asp Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp
2000 2005 2010

Gly Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly
2015 2020 2025

Val Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2030 2035 2040

Thr Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
2045 2050 2055

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asp Asn
2060 2065 2070

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Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr
2075 2080 2085

Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr
2090 2095 2100

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala
2105 2110 2115

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2120 2125 2130

Thr Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
2135 2140 2145

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2150 2155 2160

Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2165 2170 2175

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu
2180 2185 2190

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser
2195 2200 2205

Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile
2225 2230 2235

Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn
2240 2245 2250

Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn
2255 2260 2265

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Asn Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly
2270 2275 2280

Phe Glu Tyr Phe Ala Pro Ala Asn Thr Tyr Asn Asn Asn Ile Glu
2285 2290 2295

Gly Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly
2300 2305 2310

Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp
2315 2320 2325

Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala
2330 2335 2340

Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr
2345 2350 2355

Phe Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2360 2365 2370

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser
2375 2380 2385

Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr
2390 2395 2400

Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe
2405 2410 2415

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2420 2425 2430

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2435 2440 2445

Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg
2450 2455 2460

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Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val
2465 2470 2475

Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
2480 2485 2490

Asn Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser
2495 2500 2505

Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly
2510 2515 2520

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2525 2530 2535

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2540 2545 2550

Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn
2555 2560 2565

Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr
2570 2575 2580

Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr
2585 2590 2595

Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile
2600 2605 2610

Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala
2615 2620 2625

Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln
2630 2635 2640

Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

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Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly
2705 2710

<210> 151
<211> 2710
<212> PRT
<213> Clostridium difficile

<400> 151

Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1 5 10 15

Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
20 25 30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
35 40 45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr
50 55 60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65 70 75 80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
100 105 110

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```
Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
        115                 120                 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
    130                 135                 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255

Gly Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
    290                 295                 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320
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```
Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
                325                 330                 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
            340                 345                 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
        355                 360                 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
    370                 375                 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385                 390                 395                 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
                405                 410                 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
            420                 425                 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
        435                 440                 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
    450                 455                 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465                 470                 475                 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
                485                 490                 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
            500                 505                 510

Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
        515                 520                 525
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```
Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
    530                 535                 540

Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545                 550                 555                 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
                565                 570                 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
            580                 585                 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
        595                 600                 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
    610                 615                 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625                 630                 635                 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
                645                 650                 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
            660                 665                 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
        675                 680                 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
    690                 695                 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705                 710                 715                 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser
                725                 730                 735
```

```
Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
            740                 745                 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
        755                 760                 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
    770                 775                 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785                 790                 795                 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
                805                 810                 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
            820                 825                 830

Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
        835                 840                 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
    850                 855                 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865                 870                 875                 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
                885                 890                 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
            900                 905                 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
        915                 920                 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
    930                 935                 940
```

```
Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945                 950                 955                 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
                965                 970                 975

Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
            980                 985                 990

Ala Gln Leu Phe Ser Thr Gly Leu  Asn Thr Ile Tyr Asp  Ser Ile Gln
        995                 1000                1005

Leu Val  Asn Leu Ile Ser Asn  Ala Val Asn Asp Thr  Ile Asn Val
    1010                1015                1020

Leu Pro  Thr Ile Thr Glu Gly  Ile Pro Ile Val Ser  Thr Ile Leu
    1025                1030                1035

Asp Gly  Ile Asn Leu Gly Ala  Ala Ile Lys Glu Leu  Leu Asp Glu
    1040                1045                1050

His Asp  Pro Leu Leu Lys Lys  Glu Leu Glu Ala Lys  Val Gly Val
    1055                1060                1065

Leu Ala  Ile Asn Met Ser Leu  Ser Ile Ala Ala Thr  Val Ala Ser
    1070                1075                1080

Ile Val  Gly Ile Gly Ala Glu  Val Thr Ile Phe Leu  Leu Pro Ile
    1085                1090                1095

Ala Gly  Ile Ser Ala Gly Ile  Pro Ser Leu Val Asn  Asn Glu Leu
    1100                1105                1110

Ile Leu  His Asp Lys Ala Thr  Ser Val Val Asn Tyr  Phe Asn His
    1115                1120                1125

Leu Ser  Glu Ser Lys Lys Tyr  Gly Pro Leu Lys Thr  Glu Asp Asp
    1130                1135                1140
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Lys Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp
1145 1150 1155

Phe Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala
1160 1165 1170

Met Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His
1175 1180 1185

Phe Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser
1190 1195 1200

Ile Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser
1205 1210 1215

Lys Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp
1220 1225 1230

Trp Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp
1235 1240 1245

Gly Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys
1250 1255 1260

Phe Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr
1265 1270 1275

Leu Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp
1280 1285 1290

Lys Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu
1295 1300 1305

Ile Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr
1310 1315 1320

Tyr Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn
1325 1330 1335

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Leu Ser  Lys Asp Asp Leu Trp  Ile Phe Asn Ile Asp  Asn Glu Val
    1340                1345                1350

Arg Glu  Ile Ser Ile Glu Asn  Gly Thr Ile Lys Lys  Gly Lys Leu
    1355                1360                1365

Ile Lys  Asp Val Leu Ser Lys  Ile Asp Ile Asn Lys  Asn Lys Leu
    1370                1375                1380

Ile Ile  Gly Asn Gln Thr Ile  Asp Phe Ser Gly Asp  Ile Asp Asn
    1385                1390                1395

Lys Asp  Arg Tyr Ile Phe Leu  Thr Cys Glu Leu Asp  Asp Lys Ile
    1400                1405                1410

Ser Leu  Ile Ile Glu Ile Asn  Leu Val Ala Lys Ser  Tyr Ser Leu
    1415                1420                1425

Leu Leu  Ser Gly Asp Lys Asn  Tyr Leu Ile Ser Asn  Leu Ser Asn
    1430                1435                1440

Ile Ile  Glu Lys Ile Asn Thr  Leu Gly Leu Asp Ser  Lys Asn Ile
    1445                1450                1455

Ala Tyr  Asn Tyr Thr Asp Glu  Ser Asn Asn Lys Tyr  Phe Gly Ala
    1460                1465                1470

Ile Ser  Lys Thr Ser Gln Lys  Ser Ile Ile His Tyr  Lys Lys Asp
    1475                1480                1485

Ser Lys  Asn Ile Leu Glu Phe  Tyr Asn Asp Ser Thr  Leu Glu Phe
    1490                1495                1500

Asn Ser  Lys Asp Phe Ile Ala  Glu Asp Ile Asn Val  Phe Met Lys
    1505                1510                1515

Asp Asp  Ile Asn Thr Ile Thr  Gly Lys Tyr Tyr Val  Asp Asn Asn
    1520                1525                1530
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Thr Asp  Lys Ser Ile Asp Phe  Ser Ile Ser Leu Val  Ser Lys Asn
    1535                1540                1545

Gln Val  Lys Val Asn Gly Leu  Tyr Leu Asn Glu Ser  Val Tyr Ser
    1550                1555                1560

Ser Tyr  Leu Asp Phe Val Lys  Asn Ser Asp Gly His  His Asn Thr
    1565                1570                1575

Ser Asn  Phe Met Asn Leu Phe  Leu Asp Asn Ile Ser  Phe Trp Lys
    1580                1585                1590

Leu Phe  Gly Phe Glu Asn Ile  Asn Phe Val Ile Asp  Lys Tyr Phe
    1595                1600                1605

Thr Leu  Val Gly Lys Thr Asn  Leu Gly Tyr Val Glu  Phe Ile Cys
    1610                1615                1620

Asp Asn  Asn Lys Asn Ile Asp  Ile Tyr Phe Gly Glu  Trp Lys Thr
    1625                1630                1635

Ser Ser  Ser Lys Ser Thr Ile  Phe Ser Gly Asn Gly  Arg Asn Val
    1640                1645                1650

Val Val  Glu Pro Ile Tyr Asn  Pro Asp Thr Gly Glu  Asp Ile Ser
    1655                1660                1665

Thr Ser  Leu Asp Phe Ser Tyr  Glu Pro Leu Tyr Gly  Ile Asp Arg
    1670                1675                1680

Tyr Ile  Asn Lys Val Leu Ile  Ala Pro Asp Leu Tyr  Thr Ser Leu
    1685                1690                1695

Ile Asn  Ile Asn Thr Asn Tyr  Tyr Ser Asn Glu Tyr  Tyr Pro Glu
    1700                1705                1710

Ile Ile  Val Leu Asn Pro Asn  Thr Phe His Lys Lys  Val Asn Ile
    1715                1720                1725
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```
Asn Leu  Asp Ser Ser Ser Phe  Glu Tyr Lys Trp Ser  Thr Glu Gly
    1730                1735                1740

Ser Asp  Phe Ile Leu Val Arg  Tyr Leu Glu Glu Ser  Asn Lys Lys
    1745                1750                1755

Ile Leu  Gln Lys Ile Arg Ile  Lys Gly Ile Leu Ser  Asn Thr Gln
    1760                1765                1770

Ser Phe  Asn Lys Met Ser Ile  Asp Phe Lys Asp Ile  Lys Lys Leu
    1775                1780                1785

Ser Leu  Gly Tyr Ile Met Ser  Asn Phe Lys Ser Phe  Asn Ser Glu
    1790                1795                1800

Asn Glu  Leu Asp Arg Asp His  Leu Gly Phe Lys Ile  Ile Asp Asn
    1805                1810                1815

Lys Thr  Tyr Tyr Tyr Asp Glu  Asp Ser Lys Leu Val  Lys Gly Leu
    1820                1825                1830

Ile Asn  Ile Asn Asn Ser Leu  Phe Tyr Phe Asp Pro  Ile Glu Phe
    1835                1840                1845

Asn Leu  Val Thr Gly Trp Gln  Thr Ile Asn Gly Lys  Lys Tyr Tyr
    1850                1855                1860

Phe Asp  Ile Asn Thr Gly Ala  Ala Leu Ile Ser Tyr  Lys Ile Ile
    1865                1870                1875

Asn Gly  Lys His Phe Tyr Phe  Asn Asn Asp Gly Val  Met Gln Leu
    1880                1885                1890

Gly Val  Phe Lys Gly Pro Asp  Gly Phe Glu Tyr Phe  Ala Pro Ala
    1895                1900                1905

Asn Thr  Gln Asn Asn Asn Ile  Glu Gly Gln Ala Ile  Val Tyr Gln
    1910                1915                1920
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Ser Lys  Phe Leu Thr Leu Asn  Gly Lys Lys Tyr Tyr  Phe Asp Asn
    1925                1930                1935

Asp Ser  Lys Ala Val Thr Gly  Trp Arg Ile Ile Asn  Asn Glu Lys
    1940                1945                1950

Tyr Tyr  Phe Asn Pro Asn Asn  Ala Ile Ala Ala Val  Gly Leu Gln
    1955                1960                1965

Val Ile  Asp Asn Asn Lys Tyr  Tyr Phe Asn Pro Asp  Thr Ala Ile
    1970                1975                1980

Ile Ser  Lys Gly Trp Gln Thr  Val Asn Gly Ser Arg  Tyr Tyr Phe
    1985                1990                1995

Asp Thr  Asp Thr Ala Ile Ala  Phe Asn Gly Tyr Lys  Thr Ile Asp
    2000                2005                2010

Gly Lys  His Phe Tyr Phe Asp  Ser Asp Cys Val Val  Lys Ile Gly
    2015                2020                2025

Val Phe  Ser Thr Ser Asn Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2030                2035                2040

Thr Tyr  Asn Asn Asn Ile Glu  Gly Gln Ala Ile Val  Tyr Gln Ser
    2045                2050                2055

Lys Phe  Leu Thr Leu Asn Gly  Lys Lys Tyr Tyr Phe  Asp Asn Asn
    2060                2065                2070

Ser Lys  Ala Val Thr Gly Trp  Gln Thr Ile Asp Ser  Lys Lys Tyr
    2075                2080                2085

Tyr Phe  Asn Thr Asn Thr Ala  Glu Ala Ala Thr Gly  Trp Gln Thr
    2090                2095                2100

Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr Asn Thr  Ala Glu Ala
    2105                2110                2115
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Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2120 2125 2130

Thr Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
2135 2140 2145

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2150 2155 2160

Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2165 2170 2175

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu
2180 2185 2190

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser
2195 2200 2205

Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile
2225 2230 2235

Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn
2240 2245 2250

Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn
2255 2260 2265

Asn Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly
2270 2275 2280

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu
2285 2290 2295

Gly Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly
2300 2305 2310

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```
Lys Lys  Tyr Tyr Phe Asp Asn  Asp Ser Lys Ala Val  Thr Gly Trp
    2315                2320                2325

Gln Thr  Ile Asp Gly Lys Lys  Tyr Tyr Phe Asn Leu  Asn Thr Ala
    2330                2335                2340

Glu Ala  Ala Thr Gly Trp Gln  Thr Ile Asp Gly Lys  Lys Tyr Tyr
    2345                2350                2355

Phe Asn  Leu Asn Thr Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile
    2360                2365                2370

Asp Gly  Lys Lys Tyr Tyr Phe  Asn Thr Asn Thr Phe  Ile Ala Ser
    2375                2380                2385

Thr Gly  Tyr Thr Ser Ile Asn  Gly Lys His Phe Tyr  Phe Asn Thr
    2390                2395                2400

Asp Gly  Ile Met Gln Ile Gly  Val Phe Lys Gly Pro  Asn Gly Phe
    2405                2410                2415

Glu Tyr  Phe Ala Pro Ala Asn  Thr His Asn Asn Asn  Ile Glu Gly
    2420                2425                2430

Gln Ala  Ile Leu Tyr Gln Asn  Lys Phe Leu Thr Leu  Asn Gly Lys
    2435                2440                2445

Lys Tyr  Tyr Phe Gly Ser Asp  Ser Lys Ala Val Thr  Gly Leu Arg
    2450                2455                2460

Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn Thr Asn  Thr Ala Val
    2465                2470                2475

Ala Val  Thr Gly Trp Gln Thr  Ile Asn Gly Lys Lys  Tyr Tyr Phe
    2480                2485                2490

Asn Thr  Asn Thr Ser Ile Ala  Ser Thr Gly Tyr Thr  Ile Ile Ser
    2495                2500                2505
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Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly
2510 2515 2520

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2525 2530 2535

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2540 2545 2550

Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn
2555 2560 2565

Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr
2570 2575 2580

Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr
2585 2590 2595

Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile
2600 2605 2610

Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala
2615 2620 2625

Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln
2630 2635 2640

Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

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Lys Ala Pro Gly Ile Tyr Gly
2705 2710

<210> 152
<211> 2710
<212> PRT
<213> Clostridium difficile

<400> 152

Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1 5 10 15

Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
20 25 30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
35 40 45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr
50 55 60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65 70 75 80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
100 105 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
115 120 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
130 135 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145 150 155 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu

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165 170 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
180 185 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
195 200 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg
210 215 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225 230 235 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
245 250 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
260 265 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
275 280 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
290 295 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
325 330 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
340 345 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
355 360 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln

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370 375 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385 390 395 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
405 410 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
420 425 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
435 440 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
450 455 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465 470 475 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
485 490 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
500 505 510

Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
515 520 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
530 535 540

Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545 550 555 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
565 570 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser

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580 585 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
595 600 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
610 615 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625 630 635 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
645 650 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
660 665 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
675 680 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
690 695 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705 710 715 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser
725 730 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
740 745 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
755 760 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
770 775 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala

785 790 795 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
805 810 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
820 825 830

Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
835 840 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
850 855 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865 870 875 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
885 890 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
900 905 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
915 920 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
930 935 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945 950 955 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
965 970 975

Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
980 985 990

Ala Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln

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995 1000 1005

Leu Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val
1010 1015 1020

Leu Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu
1025 1030 1035

Asp Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu
1040 1045 1050

His Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val
1055 1060 1065

Leu Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser
1070 1075 1080

Ile Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile
1085 1090 1095

Ala Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu
1100 1105 1110

Ile Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His
1115 1120 1125

Leu Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp
1130 1135 1140

Lys Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp
1145 1150 1155

Phe Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala
1160 1165 1170

Met Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His
1175 1180 1185

Phe Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser

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1190 1195 1200

Ile Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser
1205 1210 1215

Lys Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp
1220 1225 1230

Trp Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp
1235 1240 1245

Gly Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys
1250 1255 1260

Phe Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr
1265 1270 1275

Leu Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp
1280 1285 1290

Lys Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu
1295 1300 1305

Ile Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr
1310 1315 1320

Tyr Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn
1325 1330 1335

Leu Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val
1340 1345 1350

Arg Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu
1355 1360 1365

Ile Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu
1370 1375 1380

Ile Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn

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1385 1390 1395

Lys Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile
1400 1405 1410

Ser Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu
1415 1420 1425

Leu Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn
1430 1435 1440

Thr Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile
1445 1450 1455

Ala Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala
1460 1465 1470

Ile Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp
1475 1480 1485

Ser Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe
1490 1495 1500

Asn Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys
1505 1510 1515

Asp Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn
1520 1525 1530

Thr Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn
1535 1540 1545

Gln Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser
1550 1555 1560

Ser Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr
1565 1570 1575

Ser Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys

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1580 1585 1590

Leu Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe
1595 1600 1605

Thr Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys
1610 1615 1620

Asp Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr
1625 1630 1635

Ser Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val
1640 1645 1650

Val Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser
1655 1660 1665

Thr Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg
1670 1675 1680

Tyr Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu
1685 1690 1695

Ile Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu
1700 1705 1710

Ile Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile
1715 1720 1725

Asn Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly
1730 1735 1740

Ser Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys
1745 1750 1755

Ile Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln
1760 1765 1770

Ser Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu

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1775 1780 1785

Ser Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu
1790 1795 1800

Asn Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn
1805 1810 1815

Lys Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu
1820 1825 1830

Ile Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe
1835 1840 1845

Asn Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr
1850 1855 1860

Phe Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile
1865 1870 1875

Asn Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu
1880 1885 1890

Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala
1895 1900 1905

Asn Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln
1910 1915 1920

Ser Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn
1925 1930 1935

Asn Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys
1940 1945 1950

Tyr Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln
1955 1960 1965

Val Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile

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1970 1975 1980

Ile Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe
1985 1990 1995

Asp Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp
2000 2005 2010

Gly Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly
2015 2020 2025

Val Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2030 2035 2040

Thr Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
2045 2050 2055

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
2060 2065 2070

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr
2075 2080 2085

Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr
2090 2095 2100

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala
2105 2110 2115

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2120 2125 2130

Thr Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
2135 2140 2145

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2150 2155 2160

Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr

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2165 2170 2175

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu
2180 2185 2190

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser
2195 2200 2205

Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile
2225 2230 2235

Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn
2240 2245 2250

Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn
2255 2260 2265

Asn Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly
2270 2275 2280

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu
2285 2290 2295

Gly Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly
2300 2305 2310

Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp
2315 2320 2325

Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala
2330 2335 2340

Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr
2345 2350 2355

Phe Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile

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2360 2365 2370

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser
2375 2380 2385

Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr
2390 2395 2400

Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe
2405 2410 2415

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2420 2425 2430

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2435 2440 2445

Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg
2450 2455 2460

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val
2465 2470 2475

Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
2480 2485 2490

Asn Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser
2495 2500 2505

Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly
2510 2515 2520

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2525 2530 2535

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2540 2545 2550

Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn

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2555 2560 2565

Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr
2570 2575 2580

Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr
2585 2590 2595

Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile
2600 2605 2610

Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala
2615 2620 2625

Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln
2630 2635 2640

Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly
2705 2710

<210> 153
<211> 2710
<212> PRT
<213> Clostridium difficile

<400> 153

Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1 5 10 15

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Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
            20                  25                  30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
        35                  40                  45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn
    50                  55                  60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65                  70                  75                  80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
            100                 105                 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
        115                 120                 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
    130                 135                 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Val Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg
    210                 215                 220
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Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
    290                 295                 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
                325                 330                 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
            340                 345                 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
        355                 360                 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
    370                 375                 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385                 390                 395                 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
                405                 410                 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
            420                 425                 430
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```
Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
        435                 440                 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
    450                 455                 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465                 470                 475                 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
                485                 490                 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
            500                 505                 510

Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
        515                 520                 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
    530                 535                 540

Asp Asn Glu Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545                 550                 555                 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
                565                 570                 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
            580                 585                 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
        595                 600                 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
    610                 615                 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625                 630                 635                 640
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Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
645 650 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
660 665 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
675 680 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
690 695 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705 710 715 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser
725 730 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
740 745 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
755 760 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
770 775 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785 790 795 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Thr Ser Val Ser
805 810 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
820 825 830

Ser Val Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
835 840 845

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```
Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
    850                 855                 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865                 870                 875                 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
                885                 890                 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
            900                 905                 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
        915                 920                 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
    930                 935                 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945                 950                 955                 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
                965                 970                 975

Lys Asp Leu Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
            980                 985                 990

Ala Gln Leu Phe Ser Thr Gly Leu  Asn Thr Ile Tyr Asp  Ser Ile Gln
        995                 1000                1005

Leu Val  Asn Leu Ile Ser Asn  Ala Val Asn Asp Thr  Ile Asn Val
    1010                1015                1020

Leu Pro  Thr Ile Thr Glu Gly  Ile Pro Ile Val Ser  Thr Ile Leu
    1025                1030                1035

Asp Gly  Ile Asn Leu Gly Ala  Ala Ile Lys Glu Leu  Leu Asp Glu
    1040                1045                1050
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```
His Asp  Pro Leu Leu Lys Lys  Glu Leu Glu Ala Lys  Val Gly Val
    1055                1060                1065

Leu Ala  Ile Asn Met Ser Leu  Ser Ile Ala Ala Thr  Val Ala Ser
    1070                1075                1080

Ile Val  Gly Ile Gly Ala Glu  Val Thr Ile Phe Leu  Leu Pro Ile
    1085                1090                1095

Ala Gly  Ile Ser Ala Gly Ile  Pro Ser Leu Val Asn  Asn Glu Leu
    1100                1105                1110

Ile Leu  His Asp Lys Ala Thr  Ser Val Val Asn Tyr  Phe Asn His
    1115                1120                1125

Leu Ser  Glu Ser Lys Glu Tyr  Gly Pro Leu Lys Thr  Glu Asp Asp
    1130                1135                1140

Lys Ile  Leu Val Pro Ile Asp  Asp Leu Val Ile Ser  Glu Ile Asp
    1145                1150                1155

Phe Asn  Asn Asn Ala Ile Lys  Leu Gly Thr Cys Asn  Ile Leu Ala
    1160                1165                1170

Met Glu  Gly Gly Ser Gly His  Thr Val Thr Gly Asn  Ile Asp His
    1175                1180                1185

Phe Phe  Ser Ser Pro Ser Ile  Ser Ser His Ile Pro  Ser Leu Ser
    1190                1195                1200

Ile Tyr  Ser Ala Ile Gly Ile  Lys Thr Glu Asn Leu  Asp Phe Ser
    1205                1210                1215

Lys Lys  Ile Met Met Leu Pro  Asn Ala Pro Ser Arg  Val Phe Trp
    1220                1225                1230

Trp Glu  Thr Gly Ala Val Pro  Gly Leu Arg Ser Leu  Glu Asn Asn
    1235                1240                1245
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```
Gly Thr  Lys Leu Leu Asp Ser  Ile Arg Asp Leu Tyr  Pro Gly Lys
    1250                1255                1260

Phe Tyr  Trp Arg Phe Tyr Ala  Phe Phe Asp Tyr Ala  Ile Thr Thr
    1265                1270                1275

Leu Lys  Pro Val Tyr Glu Asp  Thr Asn Ile Lys Ile  Lys Leu Asp
    1280                1285                1290

Lys Asp  Thr Arg Asn Phe Ile  Met Pro Thr Ile Thr  Thr Asn Glu
    1295                1300                1305

Ile Arg  Asn Lys Leu Ser Tyr  Ser Phe Asp Gly Ala  Gly Gly Thr
    1310                1315                1320

Tyr Ser  Leu Leu Leu Ser Ser  Tyr Pro Ile Ser Thr  Asn Ile Asn
    1325                1330                1335

Leu Ser  Lys Asp Asp Leu Trp  Ile Phe Asn Ile Asp  Asn Glu Val
    1340                1345                1350

Arg Glu  Ile Ser Ile Glu Asn  Gly Thr Ile Lys Lys  Gly Lys Leu
    1355                1360                1365

Ile Lys  Asp Val Leu Ser Lys  Ile Asp Ile Asn Lys  Asn Lys Leu
    1370                1375                1380

Ile Ile  Gly Asn Gln Thr Ile  Asp Phe Ser Gly Asp  Ile Asp Asn
    1385                1390                1395

Lys Asp  Arg Tyr Ile Phe Leu  Thr Cys Glu Leu Asp  Asp Lys Ile
    1400                1405                1410

Ser Leu  Ile Ile Glu Ile Asn  Leu Val Ala Lys Ser  Tyr Ser Leu
    1415                1420                1425

Leu Leu  Ser Gly Asp Lys Asn  Tyr Leu Ile Ser Asn  Leu Ser Asn
    1430                1435                1440
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Thr Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile
1445 1450 1455

Ala Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala
1460 1465 1470

Ile Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp
1475 1480 1485

Ser Lys Asn Ile Leu Glu Phe Tyr Asn Gly Ser Thr Leu Glu Phe
1490 1495 1500

Asn Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys
1505 1510 1515

Asp Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn
1520 1525 1530

Thr Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn
1535 1540 1545

Gln Ala Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser
1550 1555 1560

Ser Tyr Leu Asp Phe Val Lys Asn Ala Asp Gly His His Asn Thr
1565 1570 1575

Ser Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys
1580 1585 1590

Leu Phe Gly Phe Glu Asn Ile Asn Phe Val Val Asp Lys Tyr Phe
1595 1600 1605

Thr Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys
1610 1615 1620

Asp Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr
1625 1630 1635

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```
Ser Ser  Ser Lys Ser Thr Ile  Phe Ser Gly Asn Gly  Arg Asn Val
    1640                1645                1650

Val Val  Glu Pro Ile Tyr Asn  Pro Asp Thr Gly Glu  Asp Ile Ser
    1655                1660                1665

Thr Ser  Leu Asp Phe Ser Tyr  Glu Pro Leu Tyr Gly  Ile Asp Arg
    1670                1675                1680

Tyr Ile  Asn Lys Val Leu Ile  Ala Pro Asp Leu Tyr  Thr Ser Leu
    1685                1690                1695

Ile Asn  Ile Asn Thr Asn Tyr  Tyr Ser Asn Glu Tyr  Tyr Pro Glu
    1700                1705                1710

Ile Ile  Val Leu Asn Pro Asn  Thr Phe His Lys Lys  Val Asn Ile
    1715                1720                1725

Asn Leu  Asp Ser Ser Ser Phe  Glu Tyr Lys Trp Ser  Thr Glu Gly
    1730                1735                1740

Ser Asp  Phe Ile Leu Val Arg  Tyr Leu Glu Glu Ser  Asn Lys Lys
    1745                1750                1755

Ile Leu  Gln Lys Ile Arg Ile  Lys Gly Ile Leu Ser  Asn Thr Gln
    1760                1765                1770

Ser Phe  Asn Lys Met Ser Ile  Asp Phe Lys Asp Ile  Lys Lys Leu
    1775                1780                1785

Ser Leu  Val Tyr Ile Met Ser  Asn Phe Lys Ser Phe  Asn Ser Glu
    1790                1795                1800

Asn Glu  Leu Asp Arg Asp His  Leu Gly Phe Lys Ile  Ile Asp Asn
    1805                1810                1815

Lys Thr  Tyr Tyr Tyr Asp Glu  Ala Ser Lys Leu Val  Lys Gly Leu
    1820                1825                1830
```

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```
Ile Asn  Ile Asn Asn Ser Leu  Phe Tyr Phe Asp Pro  Ile Glu Ser
    1835                1840                1845

Asn Leu  Val Thr Gly Trp Gln  Thr Ile Asn Gly Lys  Lys Tyr Tyr
    1850                1855                1860

Phe Asp  Ile Asn Thr Gly Ala  Ala Leu Thr Ser Tyr  Lys Ile Ile
    1865                1870                1875

Asn Gly  Lys His Phe Tyr Phe  Asn Asn Asn Gly Val  Met Gln Leu
    1880                1885                1890

Gly Val  Phe Lys Gly Pro Asp  Arg Phe Glu Tyr Phe  Ala Pro Ala
    1895                1900                1905

Asn Thr  Gln Asn Asn Asn Ile  Glu Gly Gln Ala Ile  Val Tyr Gln
    1910                1915                1920

Ser Lys  Phe Leu Thr Leu Asn  Gly Lys Lys Tyr Tyr  Phe Asp Asn
    1925                1930                1935

Asp Ser  Lys Ala Val Thr Gly  Trp Arg Ile Ile Asn  Asn Glu Lys
    1940                1945                1950

Tyr Tyr  Phe Asn Pro Asn Asn  Ala Ile Ala Ala Val  Gly Leu Gln
    1955                1960                1965

Val Ile  Asp Asn Asn Lys Tyr  Tyr Phe Asn Pro Asp  Thr Ala Ile
    1970                1975                1980

Ile Ser  Lys Gly Trp Gln Thr  Val Asn Gly Ser Arg  Tyr Tyr Phe
    1985                1990                1995

Asp Thr  Asp Thr Ala Ile Ala  Phe Asn Gly Tyr Lys  Thr Ile Asp
    2000                2005                2010

Gly Lys  His Phe Tyr Phe Asp  Ser Asp Cys Val Val  Lys Ile Gly
    2015                2020                2025
```

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```
Val Phe  Ser Gly Ser Asn Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2030                2035                2040

Thr Tyr  Asn Asn Asn Ile Glu  Gly Gln Ala Ile Val  Tyr Gln Ser
    2045                2050                2055

Lys Phe  Leu Thr Leu Asn Gly  Lys Lys Tyr Tyr Phe  Asp Asn Asn
    2060                2065                2070

Ser Lys  Ala Val Thr Gly Trp  Gln Thr Ile Asp Ser  Lys Lys Tyr
    2075                2080                2085

Tyr Phe  Asn Thr Asn Thr Ala  Glu Ala Ala Thr Gly  Trp Gln Thr
    2090                2095                2100

Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr Asn Thr  Ala Glu Ala
    2105                2110                2115

Ala Thr  Gly Trp Gln Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn
    2120                2125                2130

Thr Asn  Thr Ser Ile Ala Ser  Thr Gly Tyr Thr Ile  Ile Asn Gly
    2135                2140                2145

Lys His  Phe Tyr Phe Asn Thr  Asp Gly Ile Met Gln  Ile Gly Val
    2150                2155                2160

Phe Lys  Gly Pro Asn Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr
    2165                2170                2175

Asp Ala  Asn Asn Ile Glu Gly  Gln Ala Ile Leu Tyr  Gln Asn Lys
    2180                2185                2190

Phe Leu  Thr Leu Asn Gly Lys  Lys Tyr Tyr Phe Ala  Ser Asp Ser
    2195                2200                2205

Lys Ala  Val Thr Gly Trp Arg  Ile Ile Asn Asn Lys  Lys Tyr Tyr
    2210                2215                2220
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Phe Asn Pro Asn Asn Ala Ile Ala Ala Thr His Leu Tyr Thr Ile
2225 2230 2235

Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn
2240 2245 2250

Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn
2255 2260 2265

Asn Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly
2270 2275 2280

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu
2285 2290 2295

Gly Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly
2300 2305 2310

Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp
2315 2320 2325

Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala
2330 2335 2340

Val Ala Val Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr
2345 2350 2355

Phe Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2360 2365 2370

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser
2375 2380 2385

Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr
2390 2395 2400

Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe
2405 2410 2415

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Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2420 2425 2430

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2435 2440 2445

Lys Tyr Tyr Phe Ala Ser Asp Ser Lys Ala Val Thr Gly Leu Arg
2450 2455 2460

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val
2465 2470 2475

Ala Ala Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
2480 2485 2490

Asn Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn
2495 2500 2505

Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly
2510 2515 2520

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2525 2530 2535

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2540 2545 2550

Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn
2555 2560 2565

Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Arg Arg Tyr
2570 2575 2580

Tyr Phe Glu Pro Asn Thr Ala Ile Gly Ala Asn Gly Tyr Lys Ile
2585 2590 2595

Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile
2600 2605 2610

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Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala
2615 2620 2625

Asn Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg Tyr Gln
2630 2635 2640

Asn Arg Phe Leu His Leu Leu Gly Asn Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Asn Met
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly
2705 2710

<210> 154
<211> 2710
<212> PRT
<213> Clostridium difficile

<400> 154

Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1 5 10 15

Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
20 25 30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
35 40 45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr
50 55 60

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```
Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65                  70                  75                  80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
            100                 105                 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
        115                 120                 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
    130                 135                 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270
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```
Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
    290                 295                 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
                325                 330                 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
            340                 345                 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
        355                 360                 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
    370                 375                 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385                 390                 395                 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
                405                 410                 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
            420                 425                 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
        435                 440                 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
    450                 455                 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465                 470                 475                 480
```

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```
Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
                485                 490                 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
            500                 505                 510

Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
        515                 520                 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
    530                 535                 540

Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545                 550                 555                 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
                565                 570                 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
            580                 585                 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
        595                 600                 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
    610                 615                 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625                 630                 635                 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
                645                 650                 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
            660                 665                 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
        675                 680                 685
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```
Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
    690                 695                 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705                 710                 715                 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser
                725                 730                 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
            740                 745                 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
        755                 760                 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
    770                 775                 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785                 790                 795                 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
                805                 810                 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
            820                 825                 830

Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
        835                 840                 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
    850                 855                 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865                 870                 875                 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
                885                 890                 895
```

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```
Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
            900                 905                 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
        915                 920                 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
    930                 935                 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945                 950                 955                 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
                965                 970                 975

Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
            980                 985                 990

Ala Gln Leu Phe Ser Thr Gly Leu  Asn Thr Ile Tyr Asp  Ser Ile Gln
        995                 1000                1005

Leu Val  Asn Leu Ile Ser Asn  Ala Val Asn Asp Thr  Ile Asn Val
    1010                1015                1020

Leu Pro  Thr Ile Thr Glu Gly  Ile Pro Ile Val Ser  Thr Ile Leu
    1025                1030                1035

Asp Gly  Ile Asn Leu Gly Ala  Ala Ile Lys Glu Leu  Leu Asp Glu
    1040                1045                1050

His Asp  Pro Leu Leu Lys Lys  Glu Leu Glu Ala Lys  Val Gly Val
    1055                1060                1065

Leu Ala  Ile Asn Met Ser Leu  Ser Ile Ala Ala Thr  Val Ala Ser
    1070                1075                1080

Ile Val  Gly Ile Gly Ala Glu  Val Thr Ile Phe Leu  Leu Pro Ile
    1085                1090                1095
```

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Ala Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu
1100 1105 1110

Ile Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His
1115 1120 1125

Leu Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp
1130 1135 1140

Lys Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp
1145 1150 1155

Phe Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala
1160 1165 1170

Met Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His
1175 1180 1185

Phe Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser
1190 1195 1200

Ile Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser
1205 1210 1215

Lys Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp
1220 1225 1230

Trp Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp
1235 1240 1245

Gly Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys
1250 1255 1260

Phe Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr
1265 1270 1275

Leu Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp
1280 1285 1290

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```
Lys Asp  Thr Arg Asn Phe Ile  Met Pro Thr Ile Thr  Thr Asn Glu
    1295                1300                1305

Ile Arg  Asn Lys Leu Ser Tyr  Ser Phe Asp Gly Ala  Gly Gly Thr
    1310                1315                1320

Tyr Ser  Leu Leu Leu Ser Ser  Tyr Pro Ile Ser Thr  Asn Ile Asn
    1325                1330                1335

Leu Ser  Lys Asp Asp Leu Trp  Ile Phe Asn Ile Asp  Asn Glu Val
    1340                1345                1350

Arg Glu  Ile Ser Ile Glu Asn  Gly Thr Ile Lys Lys  Gly Lys Leu
    1355                1360                1365

Ile Lys  Asp Val Leu Ser Lys  Ile Asp Ile Asn Lys  Asn Lys Leu
    1370                1375                1380

Ile Ile  Gly Asn Gln Thr Ile  Asp Phe Ser Gly Asp  Ile Asp Asn
    1385                1390                1395

Lys Asp  Arg Tyr Ile Phe Leu  Thr Cys Glu Leu Asp  Asp Lys Ile
    1400                1405                1410

Ser Leu  Ile Ile Glu Ile Asn  Leu Val Ala Lys Ser  Tyr Ser Leu
    1415                1420                1425

Leu Leu  Ser Gly Asp Lys Asn  Tyr Leu Ile Ser Asn  Leu Ser Asn
    1430                1435                1440

Thr Ile  Glu Lys Ile Asn Thr  Leu Gly Leu Asp Ser  Lys Asn Ile
    1445                1450                1455

Ala Tyr  Asn Tyr Thr Asp Glu  Ser Asn Asn Lys Tyr  Phe Gly Ala
    1460                1465                1470

Ile Ser  Lys Thr Ser Gln Lys  Ser Ile Ile His Tyr  Lys Lys Asp
    1475                1480                1485
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Ser Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe
1490 1495 1500

Asn Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys
1505 1510 1515

Asp Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn
1520 1525 1530

Thr Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn
1535 1540 1545

Gln Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser
1550 1555 1560

Ser Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr
1565 1570 1575

Ser Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys
1580 1585 1590

Leu Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe
1595 1600 1605

Thr Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys
1610 1615 1620

Asp Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr
1625 1630 1635

Ser Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val
1640 1645 1650

Val Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser
1655 1660 1665

Thr Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg
1670 1675 1680

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Tyr Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu
1685 1690 1695

Ile Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu
1700 1705 1710

Ile Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile
1715 1720 1725

Asn Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly
1730 1735 1740

Ser Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys
1745 1750 1755

Ile Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln
1760 1765 1770

Ser Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu
1775 1780 1785

Ser Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu
1790 1795 1800

Asn Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn
1805 1810 1815

Lys Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu
1820 1825 1830

Ile Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe
1835 1840 1845

Asn Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr
1850 1855 1860

Phe Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile
1865 1870 1875

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```
Asn Gly  Lys His Phe Tyr Phe  Asn Asn Asp Gly Val  Met Gln Leu
    1880                1885                1890

Gly Val  Phe Lys Gly Pro Asp  Gly Phe Glu Tyr Phe  Ala Pro Ala
    1895                1900                1905

Asn Thr  Gln Asn Asn Asn Ile  Glu Gly Gln Ala Ile  Val Tyr Gln
    1910                1915                1920

Ser Lys  Phe Leu Thr Leu Asn  Gly Lys Lys Tyr Tyr  Phe Asp Asn
    1925                1930                1935

Asp Ser  Lys Ala Val Thr Gly  Trp Arg Ile Ile Asn  Asn Glu Lys
    1940                1945                1950

Tyr Tyr  Phe Asn Pro Asn Asn  Ala Ile Ala Ala Val  Gly Leu Gln
    1955                1960                1965

Val Ile  Asp Asn Asn Lys Tyr  Tyr Phe Asn Pro Asp  Thr Ala Ile
    1970                1975                1980

Ile Ser  Lys Gly Trp Gln Thr  Val Asn Gly Ser Arg  Tyr Tyr Phe
    1985                1990                1995

Asp Thr  Asp Thr Ala Ile Ala  Phe Asn Gly Tyr Lys  Thr Ile Asp
    2000                2005                2010

Gly Lys  His Phe Tyr Phe Asp  Ser Asp Cys Val Val  Lys Ile Gly
    2015                2020                2025

Val Phe  Ser Thr Ser Asn Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2030                2035                2040

Thr Tyr  Asn Asn Asn Ile Glu  Gly Gln Ala Ile Val  Tyr Gln Ser
    2045                2050                2055

Lys Phe  Leu Thr Leu Asn Gly  Lys Lys Tyr Tyr Phe  Asp Asn Asn
    2060                2065                2070
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Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr
2075 2080 2085

Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr
2090 2095 2100

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala
2105 2110 2115

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2120 2125 2130

Thr Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
2135 2140 2145

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2150 2155 2160

Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2165 2170 2175

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu
2180 2185 2190

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser
2195 2200 2205

Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile
2225 2230 2235

Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn
2240 2245 2250

Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn
2255 2260 2265

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Asn Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly
2270 2275 2280

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu
2285 2290 2295

Gly Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly
2300 2305 2310

Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp
2315 2320 2325

Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala
2330 2335 2340

Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr
2345 2350 2355

Phe Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2360 2365 2370

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser
2375 2380 2385

Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr
2390 2395 2400

Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe
2405 2410 2415

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2420 2425 2430

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2435 2440 2445

Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg
2450 2455 2460

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Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val
2465 2470 2475

Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
2480 2485 2490

Asn Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser
2495 2500 2505

Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly
2510 2515 2520

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2525 2530 2535

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2540 2545 2550

Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn
2555 2560 2565

Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr
2570 2575 2580

Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr
2585 2590 2595

Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile
2600 2605 2610

Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala
2615 2620 2625

Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln
2630 2635 2640

Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

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Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly
2705 2710

<210> 155
<211> 2710
<212> PRT
<213> Clostridium difficile

<400> 155

Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1 5 10 15

Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
20 25 30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
35 40 45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr
50 55 60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65 70 75 80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
100 105 110

```
Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
        115                 120                 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
    130                 135                 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
    290                 295                 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320
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```
Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
                325                 330                 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
            340                 345                 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
        355                 360                 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
    370                 375                 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385                 390                 395                 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
                405                 410                 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
            420                 425                 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
        435                 440                 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
    450                 455                 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465                 470                 475                 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
                485                 490                 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
            500                 505                 510

Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
        515                 520                 525
```

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```
Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
    530                 535                 540

Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545                 550                 555                 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
                565                 570                 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
            580                 585                 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
        595                 600                 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
    610                 615                 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625                 630                 635                 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
                645                 650                 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
            660                 665                 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
        675                 680                 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
    690                 695                 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705                 710                 715                 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser
                725                 730                 735
```

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```
Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
            740                 745                 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
        755                 760                 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
    770                 775                 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785                 790                 795                 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
                805                 810                 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
            820                 825                 830

Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
        835                 840                 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
    850                 855                 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865                 870                 875                 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
                885                 890                 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
            900                 905                 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
        915                 920                 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
    930                 935                 940
```

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```
Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945                 950                 955                 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
                965                 970                 975

Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
            980                 985                 990

Ala Gln Leu Phe Ser Thr Gly Leu  Asn Thr Ile Tyr Asp  Ser Ile Gln
        995                 1000                1005

Leu Val  Asn Leu Ile Ser Asn  Ala Val Asn Asp Thr  Ile Asn Val
    1010                1015                1020

Leu Pro  Thr Ile Thr Glu Gly  Ile Pro Ile Val Ser  Thr Ile Leu
    1025                1030                1035

Asp Gly  Ile Asn Leu Gly Ala  Ala Ile Lys Glu Leu  Leu Asp Glu
    1040                1045                1050

His Asp  Pro Leu Leu Lys Lys  Glu Leu Glu Ala Lys  Val Gly Val
    1055                1060                1065

Leu Ala  Ile Asn Met Ser Leu  Ser Ile Ala Ala Thr  Val Ala Ser
    1070                1075                1080

Ile Val  Gly Ile Gly Ala Glu  Val Thr Ile Phe Leu  Leu Pro Ile
    1085                1090                1095

Ala Gly  Ile Ser Ala Gly Ile  Pro Ser Leu Val Asn  Asn Glu Leu
    1100                1105                1110

Ile Leu  His Asp Lys Ala Thr  Ser Val Val Asn Tyr  Phe Asn His
    1115                1120                1125

Leu Ser  Glu Ser Lys Lys Tyr  Gly Pro Leu Lys Thr  Glu Asp Asp
    1130                1135                1140
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Lys Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp
1145 1150 1155

Phe Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala
1160 1165 1170

Met Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His
1175 1180 1185

Phe Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser
1190 1195 1200

Ile Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser
1205 1210 1215

Lys Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp
1220 1225 1230

Trp Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp
1235 1240 1245

Gly Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys
1250 1255 1260

Phe Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr
1265 1270 1275

Leu Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp
1280 1285 1290

Lys Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu
1295 1300 1305

Ile Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr
1310 1315 1320

Tyr Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn
1325 1330 1335

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Leu Ser  Lys Asp Asp Leu Trp  Ile Phe Asn Ile Asp  Asn Glu Val
    1340                1345                1350

Arg Glu  Ile Ser Ile Glu Asn  Gly Thr Ile Lys Lys  Gly Lys Leu
    1355                1360                1365

Ile Lys  Asp Val Leu Ser Lys  Ile Asp Ile Asn Lys  Asn Lys Leu
    1370                1375                1380

Ile Ile  Gly Asn Gln Thr Ile  Asp Phe Ser Gly Asp  Ile Asp Asn
    1385                1390                1395

Lys Asp  Arg Tyr Ile Phe Leu  Thr Cys Glu Leu Asp  Asp Lys Ile
    1400                1405                1410

Ser Leu  Ile Ile Glu Ile Asn  Leu Val Ala Lys Ser  Tyr Ser Leu
    1415                1420                1425

Leu Leu  Ser Gly Asp Lys Asn  Tyr Leu Ile Ser Asn  Leu Ser Asn
    1430                1435                1440

Thr Ile  Glu Lys Ile Asn Thr  Leu Gly Leu Asp Ser  Lys Asn Ile
    1445                1450                1455

Ala Tyr  Asn Tyr Thr Asp Glu  Ser Asn Asn Lys Tyr  Phe Gly Ala
    1460                1465                1470

Ile Ser  Lys Thr Ser Gln Lys  Ser Ile Ile His Tyr  Lys Lys Asp
    1475                1480                1485

Ser Lys  Asn Ile Leu Glu Phe  Tyr Asn Asp Ser Thr  Leu Glu Phe
    1490                1495                1500

Asn Ser  Lys Asp Phe Ile Ala  Glu Asp Ile Asn Val  Phe Met Lys
    1505                1510                1515

Asp Asp  Ile Asn Thr Ile Thr  Gly Lys Tyr Tyr Val  Asp Asn Asn
    1520                1525                1530
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Thr Asp  Lys Ser Ile Asp Phe  Ser Ile Ser Leu Val  Ser Lys Asn
    1535                1540                1545

Gln Val  Lys Val Asn Gly Leu  Tyr Leu Asn Glu Ser  Val Tyr Ser
    1550                1555                1560

Ser Tyr  Leu Asp Phe Val Lys  Asn Ser Asp Gly His  His Asn Thr
    1565                1570                1575

Ser Asn  Phe Met Asn Leu Phe  Leu Asp Asn Ile Ser  Phe Trp Lys
    1580                1585                1590

Leu Phe  Gly Phe Glu Asn Ile  Asn Phe Val Ile Asp  Lys Tyr Phe
    1595                1600                1605

Thr Leu  Val Gly Lys Thr Asn  Leu Gly Tyr Val Glu  Phe Ile Cys
    1610                1615                1620

Asp Asn  Asn Lys Asn Ile Asp  Ile Tyr Phe Gly Glu  Trp Lys Thr
    1625                1630                1635

Ser Ser  Ser Lys Ser Thr Ile  Phe Ser Gly Asn Gly  Arg Asn Val
    1640                1645                1650

Val Val  Glu Pro Ile Tyr Asn  Pro Asp Thr Gly Glu  Asp Ile Ser
    1655                1660                1665

Thr Ser  Leu Asp Phe Ser Tyr  Glu Pro Leu Tyr Gly  Ile Asp Arg
    1670                1675                1680

Tyr Ile  Asn Lys Val Leu Ile  Ala Pro Asp Leu Tyr  Thr Ser Leu
    1685                1690                1695

Ile Asn  Ile Asn Thr Asn Tyr  Tyr Ser Asn Glu Tyr  Tyr Pro Glu
    1700                1705                1710

Ile Ile  Val Leu Asn Pro Asn  Thr Phe His Lys Lys  Val Asn Ile
    1715                1720                1725
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Asn Leu  Asp Ser Ser Ser Phe  Glu Tyr Lys Trp Ser  Thr Glu Gly
    1730                1735                1740

Ser Asp  Phe Ile Leu Val Arg  Tyr Leu Glu Glu Ser  Asn Lys Lys
    1745                1750                1755

Ile Leu  Gln Lys Ile Arg Ile  Lys Gly Ile Leu Ser  Asn Thr Gln
    1760                1765                1770

Ser Phe  Asn Lys Met Ser Ile  Asp Phe Lys Asp Ile  Lys Lys Leu
    1775                1780                1785

Ser Leu  Gly Tyr Ile Met Ser  Asn Phe Lys Ser Phe  Asn Ser Glu
    1790                1795                1800

Asn Glu  Leu Asp Arg Asp His  Leu Gly Phe Lys Ile  Ile Asp Asn
    1805                1810                1815

Lys Thr  Tyr Tyr Tyr Asp Glu  Asp Ser Lys Leu Val  Lys Gly Leu
    1820                1825                1830

Ile Asn  Ile Asn Asn Ser Leu  Phe Tyr Phe Asp Pro  Ile Glu Phe
    1835                1840                1845

Asn Leu  Val Thr Gly Trp Gln  Thr Ile Asn Gly Lys  Lys Tyr Tyr
    1850                1855                1860

Phe Asp  Ile Asn Thr Gly Ala  Ala Leu Thr Ser Tyr  Lys Ile Ile
    1865                1870                1875

Asn Gly  Lys His Phe Tyr Phe  Asn Asn Asp Gly Val  Met Gln Leu
    1880                1885                1890

Gly Val  Phe Lys Gly Pro Asp  Gly Phe Glu Tyr Phe  Ala Pro Ala
    1895                1900                1905

Asn Thr  Gln Asn Asn Asn Ile  Glu Gly Gln Ala Ile  Val Tyr Gln
    1910                1915                1920
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Ser Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn
1925 1930 1935

Asn Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys
1940 1945 1950

Tyr Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln
1955 1960 1965

Val Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile
1970 1975 1980

Ile Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe
1985 1990 1995

Asp Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp
2000 2005 2010

Gly Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly
2015 2020 2025

Val Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2030 2035 2040

Thr Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
2045 2050 2055

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
2060 2065 2070

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr
2075 2080 2085

Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr
2090 2095 2100

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala
2105 2110 2115

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Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2120 2125 2130

Thr Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
2135 2140 2145

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2150 2155 2160

Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2165 2170 2175

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu
2180 2185 2190

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser
2195 2200 2205

Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile
2225 2230 2235

Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn
2240 2245 2250

Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn
2255 2260 2265

Asn Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly
2270 2275 2280

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu
2285 2290 2295

Gly Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly
2300 2305 2310

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```
Lys Lys  Tyr Tyr Phe Asp Asn  Asp Ser Lys Ala Val  Thr Gly Trp
    2315                2320                2325

Gln Thr  Ile Asp Gly Lys Lys  Tyr Tyr Phe Asn Leu  Asn Thr Ala
    2330                2335                2340

Glu Ala  Ala Thr Gly Trp Gln  Thr Ile Asp Gly Lys  Lys Tyr Tyr
    2345                2350                2355

Phe Asn  Leu Asn Thr Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile
    2360                2365                2370

Asp Gly  Lys Lys Tyr Tyr Phe  Asn Thr Asn Thr Phe  Ile Ala Ser
    2375                2380                2385

Thr Gly  Tyr Thr Ser Ile Asn  Gly Lys His Phe Tyr  Phe Asn Thr
    2390                2395                2400

Asp Gly  Ile Met Gln Ile Gly  Val Phe Lys Gly Pro  Asn Gly Phe
    2405                2410                2415

Glu Tyr  Phe Ala Pro Ala Asn  Thr His Asn Asn Asn  Ile Glu Gly
    2420                2425                2430

Gln Ala  Ile Leu Tyr Gln Asn  Lys Phe Leu Thr Leu  Asn Gly Lys
    2435                2440                2445

Lys Tyr  Tyr Phe Gly Ser Asp  Ser Lys Ala Val Thr  Gly Leu Arg
    2450                2455                2460

Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn Thr Asn  Thr Ala Val
    2465                2470                2475

Ala Val  Thr Gly Trp Gln Thr  Ile Asn Gly Lys Lys  Tyr Tyr Phe
    2480                2485                2490

Asn Thr  Asn Thr Ser Ile Ala  Ser Thr Gly Tyr Thr  Ile Ile Ser
    2495                2500                2505
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Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly
2510 2515 2520

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2525 2530 2535

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2540 2545 2550

Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn
2555 2560 2565

Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr
2570 2575 2580

Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr
2585 2590 2595

Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile
2600 2605 2610

Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala
2615 2620 2625

Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln
2630 2635 2640

Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

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Lys Ala Pro Gly Ile Tyr Gly
2705 2710

<210> 156
<211> 2710
<212> PRT
<213> Clostridium difficile

<400> 156

Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1 5 10 15

Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
20 25 30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
35 40 45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr
50 55 60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65 70 75 80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
100 105 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
115 120 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
130 135 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145 150 155 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu

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165 170 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
180 185 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
195 200 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg
210 215 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225 230 235 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
245 250 255

Gly Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
260 265 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
275 280 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
290 295 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
325 330 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
340 345 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
355 360 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln

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370 375 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385 390 395 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
405 410 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
420 425 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
435 440 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
450 455 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465 470 475 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
485 490 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
500 505 510

Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
515 520 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
530 535 540

Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545 550 555 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
565 570 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser

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580 585 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
595 600 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
610 615 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625 630 635 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
645 650 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
660 665 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
675 680 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
690 695 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705 710 715 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser
725 730 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
740 745 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
755 760 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
770 775 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala

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785 790 795 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
805 810 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
820 825 830

Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
835 840 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
850 855 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865 870 875 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
885 890 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
900 905 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
915 920 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
930 935 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945 950 955 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
965 970 975

Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
980 985 990

Ala Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln

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995 1000 1005

Leu Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val
1010 1015 1020

Leu Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu
1025 1030 1035

Asp Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu
1040 1045 1050

His Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val
1055 1060 1065

Leu Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser
1070 1075 1080

Ile Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile
1085 1090 1095

Ala Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu
1100 1105 1110

Ile Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His
1115 1120 1125

Leu Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp
1130 1135 1140

Lys Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp
1145 1150 1155

Phe Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala
1160 1165 1170

Met Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His
1175 1180 1185

Phe Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser

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1190 1195 1200

Ile Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser
1205 1210 1215

Lys Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp
1220 1225 1230

Trp Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp
1235 1240 1245

Gly Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys
1250 1255 1260

Phe Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr
1265 1270 1275

Leu Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp
1280 1285 1290

Lys Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu
1295 1300 1305

Ile Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr
1310 1315 1320

Tyr Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn
1325 1330 1335

Leu Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val
1340 1345 1350

Arg Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu
1355 1360 1365

Ile Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu
1370 1375 1380

Ile Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn

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1385 1390 1395

Lys Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile
1400 1405 1410

Ser Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu
1415 1420 1425

Leu Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn
1430 1435 1440

Ile Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile
1445 1450 1455

Ala Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala
1460 1465 1470

Ile Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp
1475 1480 1485

Ser Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe
1490 1495 1500

Asn Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys
1505 1510 1515

Asp Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn
1520 1525 1530

Thr Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn
1535 1540 1545

Gln Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser
1550 1555 1560

Ser Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr
1565 1570 1575

Ser Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys

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1580 1585 1590

Leu Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe
1595 1600 1605

Thr Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys
1610 1615 1620

Asp Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr
1625 1630 1635

Ser Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val
1640 1645 1650

Val Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser
1655 1660 1665

Thr Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg
1670 1675 1680

Tyr Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu
1685 1690 1695

Ile Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu
1700 1705 1710

Ile Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile
1715 1720 1725

Asn Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly
1730 1735 1740

Ser Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys
1745 1750 1755

Ile Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln
1760 1765 1770

Ser Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu

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1775 1780 1785

Ser Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu
1790 1795 1800

Asn Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn
1805 1810 1815

Lys Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu
1820 1825 1830

Ile Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe
1835 1840 1845

Asn Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr
1850 1855 1860

Phe Asp Ile Asn Thr Gly Ala Ala Leu Ile Ser Tyr Lys Ile Ile
1865 1870 1875

Asn Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu
1880 1885 1890

Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala
1895 1900 1905

Asn Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln
1910 1915 1920

Ser Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn
1925 1930 1935

Asp Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys
1940 1945 1950

Tyr Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln
1955 1960 1965

Val Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile

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1970 1975 1980

Ile Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe
1985 1990 1995

Asp Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp
2000 2005 2010

Gly Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly
2015 2020 2025

Val Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2030 2035 2040

Thr Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
2045 2050 2055

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
2060 2065 2070

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr
2075 2080 2085

Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr
2090 2095 2100

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala
2105 2110 2115

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2120 2125 2130

Thr Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
2135 2140 2145

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2150 2155 2160

Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr

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2165 2170 2175

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu
2180 2185 2190

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser
2195 2200 2205

Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile
2225 2230 2235

Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn
2240 2245 2250

Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn
2255 2260 2265

Asn Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly
2270 2275 2280

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu
2285 2290 2295

Gly Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly
2300 2305 2310

Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp
2315 2320 2325

Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala
2330 2335 2340

Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr
2345 2350 2355

Phe Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile

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2360 2365 2370

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser
2375 2380 2385

Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr
2390 2395 2400

Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe
2405 2410 2415

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2420 2425 2430

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2435 2440 2445

Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg
2450 2455 2460

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val
2465 2470 2475

Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
2480 2485 2490

Asn Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser
2495 2500 2505

Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly
2510 2515 2520

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2525 2530 2535

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2540 2545 2550

Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn

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2555 2560 2565

Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr
2570 2575 2580

Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr
2585 2590 2595

Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile
2600 2605 2610

Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala
2615 2620 2625

Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln
2630 2635 2640

Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly
2705 2710

<210> 157
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<212> PRT
<213> Clostridium difficile

<400> 157

Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1 5 10 15

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Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
            20                  25                  30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
        35                  40                  45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr
    50                  55                  60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65                  70                  75                  80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
            100                 105                 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
        115                 120                 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
    130                 135                 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg
    210                 215                 220
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Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
    290                 295                 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
                325                 330                 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
            340                 345                 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
        355                 360                 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
    370                 375                 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385                 390                 395                 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
                405                 410                 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
            420                 425                 430
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```
Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
        435                 440                 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
    450                 455                 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465                 470                 475                 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
                485                 490                 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
            500                 505                 510

Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
        515                 520                 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
    530                 535                 540

Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545                 550                 555                 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
                565                 570                 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
            580                 585                 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
        595                 600                 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
    610                 615                 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625                 630                 635                 640
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Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
645 650 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
660 665 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
675 680 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
690 695 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705 710 715 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser
725 730 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
740 745 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
755 760 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
770 775 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785 790 795 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
805 810 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
820 825 830

Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
835 840 845

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```
Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
    850                 855                 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865                 870                 875                 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
                885                 890                 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
            900                 905                 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
        915                 920                 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
    930                 935                 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945                 950                 955                 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
                965                 970                 975

Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
            980                 985                 990

Ala Gln Leu Phe Ser Thr Gly Leu  Asn Thr Ile Tyr Asp  Ser Ile Gln
        995                 1000                1005

Leu Val  Asn Leu Ile Ser Asn  Ala Val Asn Asp Thr  Ile Asn Val
    1010                1015                1020

Leu Pro  Thr Ile Thr Glu Gly  Ile Pro Ile Val Ser  Thr Ile Leu
    1025                1030                1035

Asp Gly  Ile Asn Leu Gly Ala  Ala Ile Lys Glu Leu  Leu Asp Glu
    1040                1045                1050
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His Asp  Pro Leu Leu Lys Lys  Glu Leu Glu Ala Lys  Val Gly Val
    1055                1060                1065

Leu Ala  Ile Asn Met Ser Leu  Ser Ile Ala Ala Thr  Val Ala Ser
    1070                1075                1080

Ile Val  Gly Ile Gly Ala Glu  Val Thr Ile Phe Leu  Leu Pro Ile
    1085                1090                1095

Ala Gly  Ile Ser Ala Gly Ile  Pro Ser Leu Val Asn  Asn Glu Leu
    1100                1105                1110

Ile Leu  His Asp Lys Ala Thr  Ser Val Val Asn Tyr  Phe Asn His
    1115                1120                1125

Leu Ser  Glu Ser Lys Lys Tyr  Gly Pro Leu Lys Thr  Glu Asp Asp
    1130                1135                1140

Lys Ile  Leu Val Pro Ile Asp  Asp Leu Val Ile Ser  Glu Ile Asp
    1145                1150                1155

Phe Asn  Asn Asn Ser Ile Lys  Leu Gly Thr Cys Asn  Ile Leu Ala
    1160                1165                1170

Met Glu  Gly Gly Ser Gly His  Thr Val Thr Gly Asn  Ile Asp His
    1175                1180                1185

Phe Phe  Ser Ser Pro Ser Ile  Ser Ser His Ile Pro  Ser Leu Ser
    1190                1195                1200

Ile Tyr  Ser Ala Ile Gly Ile  Glu Thr Glu Asn Leu  Asp Phe Ser
    1205                1210                1215

Lys Lys  Ile Met Met Leu Pro  Asn Ala Pro Ser Arg  Val Phe Trp
    1220                1225                1230

Trp Glu  Thr Gly Ala Val Pro  Gly Leu Arg Ser Leu  Glu Asn Asp
    1235                1240                1245
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```
Gly Thr  Arg Leu Leu Asp Ser  Ile Arg Asp Leu Tyr  Pro Gly Lys
    1250                1255                1260

Phe Tyr  Trp Arg Phe Tyr Ala  Phe Phe Asp Tyr Ala  Ile Thr Thr
    1265                1270                1275

Leu Lys  Pro Val Tyr Glu Asn  Thr Asn Ile Lys Ile  Lys Leu Asp
    1280                1285                1290

Lys Asp  Thr Arg Asn Phe Ile  Met Pro Thr Ile Thr  Thr Asn Glu
    1295                1300                1305

Ile Arg  Asn Lys Leu Ser Tyr  Ser Phe Asp Gly Ala  Gly Gly Thr
    1310                1315                1320

Tyr Ser  Leu Leu Leu Ser Ser  Tyr Pro Ile Ser Thr  Asn Ile Asn
    1325                1330                1335

Leu Ser  Lys Asp Asp Leu Trp  Ile Phe Asn Ile Asp  Asn Glu Val
    1340                1345                1350

Arg Glu  Ile Ser Ile Glu Asn  Gly Thr Ile Lys Lys  Gly Lys Leu
    1355                1360                1365

Ile Lys  Asp Val Leu Ser Lys  Ile Asp Ile Asn Lys  Asn Lys Leu
    1370                1375                1380

Ile Ile  Gly Asn Gln Thr Ile  Asp Phe Ser Gly Asp  Ile Asp Asn
    1385                1390                1395

Lys Asp  Arg Tyr Ile Phe Leu  Thr Cys Glu Leu Asp  Asp Lys Ile
    1400                1405                1410

Ser Leu  Ile Ile Glu Ile Asn  Leu Val Ala Lys Ser  Tyr Ser Leu
    1415                1420                1425

Leu Leu  Ser Gly Asp Lys Asn  Tyr Leu Ile Ser Asn  Leu Ser Asn
    1430                1435                1440
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```
Thr Ile  Glu Lys Ile Asn Thr  Leu Gly Leu Asp Ser  Lys Asn Ile
    1445                1450                1455

Ala Tyr  Asn Tyr Thr Asp Glu  Ser Asn Asn Lys Tyr  Phe Gly Ala
    1460                1465                1470

Ile Ser  Lys Thr Ser Gln Lys  Ser Ile Ile His Tyr  Lys Lys Asp
    1475                1480                1485

Ser Lys  Asn Ile Leu Glu Phe  Tyr Asn Asp Ser Thr  Leu Glu Phe
    1490                1495                1500

Asn Ser  Lys Asp Phe Ile Ala  Glu Asp Ile Asn Val  Phe Met Lys
    1505                1510                1515

Asp Asp  Ile Asn Thr Ile Thr  Gly Lys Tyr Tyr Val  Asp Asn Asn
    1520                1525                1530

Thr Asp  Lys Ser Ile Asp Phe  Ser Ile Ser Leu Val  Ser Lys Asn
    1535                1540                1545

Gln Val  Lys Val Asn Gly Leu  Tyr Leu Asn Glu Ser  Val Tyr Ser
    1550                1555                1560

Ser Tyr  Leu Asp Phe Val Lys  Asn Ser Asp Gly His  His Asn Thr
    1565                1570                1575

Ser Asn  Phe Met Asn Leu Phe  Leu Asp Asn Ile Ser  Phe Trp Lys
    1580                1585                1590

Leu Phe  Gly Phe Glu Asn Ile  Asn Phe Val Ile Asp  Lys Tyr Phe
    1595                1600                1605

Thr Leu  Val Gly Lys Thr Asn  Leu Gly Tyr Val Glu  Phe Ile Cys
    1610                1615                1620

Asp Asn  Asn Lys Asn Ile Asp  Ile Tyr Phe Gly Glu  Trp Lys Thr
    1625                1630                1635
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Ser Ser  Ser Lys Ser Thr Ile  Phe Ser Gly Asn Gly  Arg Asn Val
    1640                1645                1650

Val Val  Glu Pro Ile Tyr Asn  Pro Asp Thr Gly Glu  Asp Ile Ser
    1655                1660                1665

Thr Ser  Leu Asp Phe Ser Tyr  Glu Pro Leu Tyr Gly  Ile Asp Arg
    1670                1675                1680

Tyr Ile  Asn Lys Val Leu Ile  Ala Pro Asp Leu Tyr  Thr Ser Leu
    1685                1690                1695

Ile Asn  Ile Asn Thr Asn Tyr  Tyr Ser Asn Glu Tyr  Tyr Pro Glu
    1700                1705                1710

Ile Ile  Val Leu Asn Pro Asn  Thr Phe His Lys Lys  Val Asn Ile
    1715                1720                1725

Asn Leu  Asp Ser Ser Ser Phe  Glu Tyr Lys Trp Ser  Thr Glu Gly
    1730                1735                1740

Ser Asp  Phe Ile Leu Val Arg  Tyr Leu Glu Glu Ser  Asn Lys Lys
    1745                1750                1755

Ile Leu  Gln Lys Ile Arg Ile  Lys Gly Ile Leu Ser  Asn Thr Gln
    1760                1765                1770

Ser Phe  Asn Lys Met Ser Ile  Asp Phe Lys Asp Ile  Lys Lys Leu
    1775                1780                1785

Ser Leu  Gly Tyr Ile Met Ser  Asn Phe Lys Ser Phe  Asn Ser Glu
    1790                1795                1800

Asn Glu  Leu Asp Arg Asp His  Leu Gly Phe Lys Ile  Ile Asp Asn
    1805                1810                1815

Lys Thr  Tyr Tyr Tyr Asp Glu  Asp Ser Lys Leu Val  Lys Gly Leu
    1820                1825                1830
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```
Ile Asn  Ile Asn Asn Ser Leu  Phe Tyr Phe Asp Pro  Ile Glu Phe
    1835                1840                1845

Asn Leu  Val Thr Gly Trp Gln  Thr Ile Asn Gly Lys  Lys Tyr Tyr
    1850                1855                1860

Phe Asp  Ile Asn Thr Gly Ala  Ala Leu Thr Ser Tyr  Lys Ile Ile
    1865                1870                1875

Asn Gly  Lys His Phe Tyr Phe  Asn Asn Asp Gly Val  Met Gln Leu
    1880                1885                1890

Gly Val  Phe Lys Gly Pro Asp  Gly Phe Glu Tyr Phe  Ala Pro Ala
    1895                1900                1905

Asn Thr  Gln Asn Asn Asn Ile  Glu Gly Gln Ala Ile  Val Tyr Gln
    1910                1915                1920

Ser Lys  Phe Leu Thr Leu Asn  Gly Lys Lys Tyr Tyr  Phe Asp Asn
    1925                1930                1935

Asp Ser  Lys Ala Val Thr Gly  Trp Arg Ile Ile Asn  Asn Glu Lys
    1940                1945                1950

Tyr Tyr  Phe Asn Pro Asn Asn  Ala Ile Ala Ala Val  Gly Leu Gln
    1955                1960                1965

Val Ile  Asp Asn Asn Lys Tyr  Tyr Phe Asn Pro Asp  Thr Ala Ile
    1970                1975                1980

Ile Ser  Lys Gly Trp Gln Thr  Val Asn Gly Ser Arg  Tyr Tyr Phe
    1985                1990                1995

Asp Thr  Asp Thr Ala Ile Ala  Phe Asn Gly Tyr Lys  Thr Ile Asp
    2000                2005                2010

Gly Lys  His Phe Tyr Phe Asp  Ser Asp Cys Val Val  Lys Ile Gly
    2015                2020                2025
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Val Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2030 2035 2040

Thr Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
2045 2050 2055

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asp Asn
2060 2065 2070

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr
2075 2080 2085

Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr
2090 2095 2100

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala
2105 2110 2115

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2120 2125 2130

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ser Ile Asn Gly
2135 2140 2145

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2150 2155 2160

Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2165 2170 2175

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu
2180 2185 2190

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser
2195 2200 2205

Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr
2210 2215 2220

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```
Phe Asn  Pro Asn Asn Ala Ile  Ala Ala Ile His Leu  Cys Thr Ile
    2225                2230                2235

Asn Asn  Asp Lys Tyr Tyr Phe  Ser Tyr Asp Gly Ile  Leu Gln Asn
    2240                2245                2250

Gly Tyr  Ile Thr Ile Glu Arg  Asn Asn Phe Tyr Phe  Asp Ala Asn
    2255                2260                2265

Asn Glu  Ser Lys Met Val Thr  Gly Val Phe Lys Gly  Pro Asn Gly
    2270                2275                2280

Phe Glu  Tyr Phe Ala Pro Ala  Asn Thr His Asn Asn  Asn Ile Glu
    2285                2290                2295

Gly Gln  Ala Ile Val Tyr Gln  Asn Lys Phe Leu Thr  Leu Asn Gly
    2300                2305                2310

Lys Lys  Tyr Tyr Phe Asp Asn  Asp Ser Lys Ala Val  Thr Gly Trp
    2315                2320                2325

Gln Thr  Ile Asp Gly Lys Lys  Tyr Tyr Phe Asn Leu  Asn Thr Ala
    2330                2335                2340

Glu Ala  Ala Thr Gly Trp Gln  Thr Ile Asp Gly Lys  Lys Tyr Tyr
    2345                2350                2355

Phe Asn  Leu Asn Thr Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile
    2360                2365                2370

Asp Gly  Lys Lys Tyr Tyr Phe  Asn Thr Asn Thr Phe  Ile Ala Ser
    2375                2380                2385

Thr Gly  Tyr Thr Ser Ile Asn  Gly Lys His Phe Tyr  Phe Asn Thr
    2390                2395                2400

Asp Gly  Ile Met Gln Ile Gly  Val Phe Lys Gly Pro  Asn Gly Phe
    2405                2410                2415
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Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2420 2425 2430

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2435 2440 2445

Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg
2450 2455 2460

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val
2465 2470 2475

Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
2480 2485 2490

Asn Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser
2495 2500 2505

Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly
2510 2515 2520

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2525 2530 2535

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2540 2545 2550

Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn
2555 2560 2565

Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr
2570 2575 2580

Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr
2585 2590 2595

Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile
2600 2605 2610

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Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala
2615 2620 2625

Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln
2630 2635 2640

Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly
2705 2710

<210> 158
<211> 2366
<212> PRT
<213> Clostridium difficile

<400> 158

Met Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg
1 5 10 15

Phe Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
20 25 30

Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
35 40 45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
50 55 60

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```
Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65                  70                  75                  80

Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys
                85                  90                  95

Asn Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
            100                 105                 110

Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
        115                 120                 125

Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
    130                 135                 140

Val Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145                 150                 155                 160

Leu Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met
                165                 170                 175

Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala
            180                 185                 190

Gln Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr
        195                 200                 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr
    210                 215                 220

Ile Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val
225                 230                 235                 240

Arg Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu
                245                 250                 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu
            260                 265                 270
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```
Arg Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp
        275                 280                 285

Met Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro
    290                 295                 300

Ser Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile
305                 310                 315                 320

Met Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp
                325                 330                 335

Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
            340                 345                 350

Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala
        355                 360                 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn
    370                 375                 380

Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val
385                 390                 395                 400

Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro
                405                 410                 415

Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile
            420                 425                 430

Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met
        435                 440                 445

Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr
    450                 455                 460

Thr Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp
465                 470                 475                 480
```

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```
Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala
                485                 490                 495

Asp Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr
            500                 505                 510

Glu Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys
        515                 520                 525

Ala Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly
    530                 535                 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu
545                 550                 555                 560

Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly
                565                 570                 575

Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
            580                 585                 590

Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe
        595                 600                 605

Gln Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly
    610                 615                 620

Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile
625                 630                 635                 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp
                645                 650                 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser
            660                 665                 670

Thr Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro
        675                 680                 685
```

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```
Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser
    690                 695                 700

Ile Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys
705                 710                 715                 720

Asp Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
                725                 730                 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg
            740                 745                 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
        755                 760                 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
    770                 775                 780

Asn Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785                 790                 795                 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu
                805                 810                 815

Glu Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
            820                 825                 830

Asp Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr
        835                 840                 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser
    850                 855                 860

Ile Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp
865                 870                 875                 880

Ser His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe
                885                 890                 895
```

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```
Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
            900                 905                 910

Thr Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu
        915                 920                 925

Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
    930                 935                 940

Val Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn
945                 950                 955                 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu
                965                 970                 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
            980                 985                 990

Leu Phe Ser Thr Gly Leu Asn Thr  Ile Thr Asp Ala Ala  Lys Val Val
        995                 1000                1005

Glu Leu  Val Ser Thr Ala Leu  Asp Glu Thr Ile Asp  Leu Leu Pro
    1010                1015                1020

Thr Leu  Ser Glu Gly Leu Pro  Ile Ile Ala Thr Ile  Ile Asp Gly
    1025                1030                1035

Val Ser  Leu Gly Ala Ala Ile  Lys Glu Leu Ser Glu  Thr Ser Asp
    1040                1045                1050

Pro Leu  Leu Arg Gln Glu Ile  Glu Ala Lys Ile Gly  Ile Met Ala
    1055                1060                1065

Val Asn  Leu Thr Thr Ala Thr  Thr Ala Ile Ile Thr  Ser Ser Leu
    1070                1075                1080

Gly Val  Ala Ser Gly Phe Ser  Ile Leu Leu Val Pro  Leu Ala Gly
    1085                1090                1095
```

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```
Ile Ser  Ala Gly Ile Pro Ser  Leu Val Asn Asn Glu  Leu Val Leu
    1100                1105                1110

Arg Asp  Lys Ala Thr Lys Val  Val Asp Tyr Phe Lys  His Val Ser
    1115                1120                1125

Leu Val  Glu Thr Glu Gly Val  Phe Thr Leu Leu Asp  Asp Lys Ile
    1130                1135                1140

Met Met  Pro Gln Asp Asp Leu  Val Ile Ser Glu Ile  Asp Phe Asn
    1145                1150                1155

Asn Asn  Ser Ile Val Leu Gly  Lys Cys Glu Ile Trp  Arg Met Glu
    1160                1165                1170

Gly Gly  Ser Gly His Thr Val  Thr Asp Asp Ile Asp  His Phe Phe
    1175                1180                1185

Ser Ala  Pro Ser Ile Thr Tyr  Arg Glu Pro His Leu  Ser Ile Tyr
    1190                1195                1200

Asp Val  Leu Glu Val Gln Lys  Glu Glu Leu Asp Leu  Ser Lys Asp
    1205                1210                1215

Leu Met  Val Leu Pro Asn Ala  Pro Asn Arg Val Phe  Ala Trp Glu
    1220                1225                1230

Thr Gly  Trp Thr Pro Gly Leu  Arg Ser Leu Glu Asn  Asp Gly Thr
    1235                1240                1245

Lys Leu  Leu Asp Arg Ile Arg  Asp Asn Tyr Glu Gly  Glu Phe Tyr
    1250                1255                1260

Trp Arg  Tyr Phe Ala Phe Ile  Ala Asp Ala Leu Ile  Thr Thr Leu
    1265                1270                1275

Lys Pro  Arg Tyr Glu Asp Thr  Asn Ile Arg Ile Asn  Leu Asp Ser
    1280                1285                1290
```

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```
Asn Thr  Arg Ser Phe Ile Val  Pro Ile Ile Thr Thr  Glu Tyr Ile
    1295                1300                1305

Arg Glu  Lys Leu Ser Tyr Ser  Phe Tyr Gly Ser Gly  Gly Thr Tyr
    1310                1315                1320

Ala Leu  Ser Leu Ser Gln Tyr  Asn Met Gly Ile Asn  Ile Glu Leu
    1325                1330                1335

Ser Glu  Ser Asp Val Trp Ile  Ile Asp Val Asp Asn  Val Val Arg
    1340                1345                1350

Asp Val  Thr Ile Glu Ser Asp  Lys Ile Lys Lys Gly  Asp Leu Ile
    1355                1360                1365

Glu Gly  Ile Leu Ser Thr Leu  Ser Ile Glu Glu Asn  Lys Ile Ile
    1370                1375                1380

Leu Asn  Ser His Glu Ile Asn  Phe Ser Gly Glu Val  Asn Gly Ser
    1385                1390                1395

Asn Gly  Phe Val Ser Leu Thr  Phe Ser Ile Leu Glu  Gly Ile Asn
    1400                1405                1410

Ala Ile  Ile Glu Val Asp Leu  Leu Ser Lys Ser Tyr  Lys Leu Leu
    1415                1420                1425

Ile Ser  Gly Glu Leu Lys Ile  Leu Met Leu Asn Ser  Asn His Ile
    1430                1435                1440

Gln Gln  Lys Ile Asp Tyr Ile  Gly Phe Asn Ser Glu  Leu Gln Lys
    1445                1450                1455

Asn Ile  Pro Tyr Ser Phe Val  Asp Ser Glu Gly Lys  Glu Asn Gly
    1460                1465                1470

Phe Ile  Asn Gly Ser Thr Lys  Glu Gly Leu Phe Val  Ser Glu Leu
    1475                1480                1485
```

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```
Pro Asp  Val Val Leu Ile Ser  Lys Val Tyr Met Asp  Asp Ser Lys
    1490                1495                1500

Pro Ser  Phe Gly Tyr Tyr Ser  Asn Asn Leu Lys Asp  Val Lys Val
    1505                1510                1515

Ile Thr  Lys Asp Asn Val Asn  Ile Leu Thr Gly Tyr  Tyr Leu Lys
    1520                1525                1530

Asp Asp  Ile Lys Ile Ser Leu  Ser Leu Thr Leu Gln  Asp Glu Lys
    1535                1540                1545

Thr Ile  Lys Leu Asn Ser Val  His Leu Asp Glu Ser  Gly Val Ala
    1550                1555                1560

Glu Ile  Leu Lys Phe Met Asn  Arg Lys Gly Asn Thr  Asn Thr Ser
    1565                1570                1575

Asp Ser  Leu Met Ser Phe Leu  Glu Ser Met Asn Ile  Lys Ser Ile
    1580                1585                1590

Phe Val  Asn Phe Leu Gln Ser  Asn Ile Lys Phe Ile  Leu Asp Ala
    1595                1600                1605

Asn Phe  Ile Ile Ser Gly Thr  Thr Ser Ile Gly Gln  Phe Glu Phe
    1610                1615                1620

Ile Cys  Asp Glu Asn Asp Asn  Ile Gln Pro Tyr Phe  Ile Lys Phe
    1625                1630                1635

Asn Thr  Leu Glu Thr Asn Tyr  Thr Leu Tyr Val Gly  Asn Arg Gln
    1640                1645                1650

Asn Met  Ile Val Glu Pro Asn  Tyr Asp Leu Asp Asp  Ser Gly Asp
    1655                1660                1665

Ile Ser  Ser Thr Val Ile Asn  Phe Ser Gln Lys Tyr  Leu Tyr Gly
    1670                1675                1680
```

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```
Ile Asp  Ser Cys Val Asn Lys  Val Val Ile Ser Pro  Asn Ile Tyr
    1685                1690                1695

Thr Asp  Glu Ile Asn Ile Thr  Pro Val Tyr Glu Thr  Asn Asn Thr
    1700                1705                1710

Tyr Pro  Glu Val Ile Val Leu  Asp Ala Asn Tyr Ile  Asn Glu Lys
    1715                1720                1725

Ile Asn  Val Asn Ile Asn Asp  Leu Ser Ile Arg Tyr  Val Trp Ser
    1730                1735                1740

Asn Asp  Gly Asn Asp Phe Ile  Leu Met Ser Thr Ser  Glu Glu Asn
    1745                1750                1755

Lys Val  Ser Gln Val Lys Ile  Arg Phe Val Asn Val  Phe Lys Asp
    1760                1765                1770

Lys Thr  Leu Ala Asn Lys Leu  Ser Phe Asn Phe Ser  Asp Lys Gln
    1775                1780                1785

Asp Val  Pro Val Ser Glu Ile  Ile Leu Ser Phe Thr  Pro Ser Tyr
    1790                1795                1800

Tyr Glu  Asp Gly Leu Ile Gly  Tyr Asp Leu Gly Leu  Val Ser Leu
    1805                1810                1815

Tyr Asn  Glu Lys Phe Tyr Ile  Asn Asn Phe Gly Met  Met Val Ser
    1820                1825                1830

Gly Leu  Ile Tyr Ile Asn Asp  Ser Leu Tyr Tyr Phe  Lys Pro Pro
    1835                1840                1845

Val Asn  Asn Leu Ile Thr Gly  Phe Val Thr Val Gly  Asp Asp Lys
    1850                1855                1860

Tyr Tyr  Phe Asn Pro Ile Asn  Gly Gly Ala Ala Ser  Ile Gly Glu
    1865                1870                1875
```

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Thr Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val
1880 1885 1890

Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
1895 1900 1905

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile
1910 1915 1920

Asp Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe
1925 1930 1935

Asp Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly
1940 1945 1950

Glu Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly
1955 1960 1965

Leu Asn Gln Ile Gly Asp Tyr Lys Tyr Tyr Phe Asn Ser Asp Gly
1970 1975 1980

Val Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr
1985 1990 1995

Phe Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp
2000 2005 2010

Gly Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly
2015 2020 2025

Val Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn
2030 2035 2040

Glu Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly
2045 2050 2055

Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe
2060 2065 2070

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Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr
2075 2080 2085

Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu
2090 2095 2100

Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln
2105 2110 2115

Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp
2120 2125 2130

Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
2135 2140 2145

Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp
2150 2155 2160

Thr Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn
2165 2170 2175

Asp Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg
2180 2185 2190

Val Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu
2195 2200 2205

Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile
2225 2230 2235

Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr
2240 2245 2250

Gly Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn
2255 2260 2265

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Gly Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe
2270 2275 2280

Tyr Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr
2285 2290 2295

Pro Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu
2300 2305 2310

Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu
2315 2320 2325

Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr
2330 2335 2340

Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp
2345 2350 2355

Thr Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 159
<211> 2366
<212> PRT
<213> Clostridium difficile

<400> 159

Met Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg
1 5 10 15

Phe Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
20 25 30

Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
35 40 45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
50 55 60

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```
Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65                  70                  75                  80

Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys
                85                  90                  95

Asn Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
            100                 105                 110

Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
        115                 120                 125

Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
    130                 135                 140

Val Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145                 150                 155                 160

Leu Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met
                165                 170                 175

Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala
            180                 185                 190

Gln Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr
        195                 200                 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr
    210                 215                 220

Ile Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val
225                 230                 235                 240

Arg Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu
                245                 250                 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu
            260                 265                 270
```

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```
Arg Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp
        275                 280                 285

Met Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro
    290                 295                 300

Ser Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile
305                 310                 315                 320

Met Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp
                325                 330                 335

Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
            340                 345                 350

Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala
        355                 360                 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn
    370                 375                 380

Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val
385                 390                 395                 400

Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro
                405                 410                 415

Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile
            420                 425                 430

Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met
        435                 440                 445

Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr
    450                 455                 460

Thr Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp
465                 470                 475                 480
```

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```
Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala
                485                 490                 495

Asp Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr
            500                 505                 510

Glu Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys
        515                 520                 525

Ala Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly
    530                 535                 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu
545                 550                 555                 560

Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly
                565                 570                 575

Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
            580                 585                 590

Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe
        595                 600                 605

Gln Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly
    610                 615                 620

Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile
625                 630                 635                 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp
                645                 650                 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser
            660                 665                 670

Thr Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro
        675                 680                 685
```

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```
Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser
    690                 695                 700

Ile Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys
705                 710                 715                 720

Asp Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
                725                 730                 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg
            740                 745                 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
        755                 760                 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
    770                 775                 780

Asn Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785                 790                 795                 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu
                805                 810                 815

Glu Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
            820                 825                 830

Asp Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr
        835                 840                 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser
    850                 855                 860

Ile Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp
865                 870                 875                 880

Ser His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe
                885                 890                 895
```

```
Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
            900                 905                 910

Thr Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu
        915                 920                 925

Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
    930                 935                 940

Val Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn
945                 950                 955                 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu
                965                 970                 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
            980                 985                 990

Leu Phe Ser Thr Gly Leu Asn Thr  Ile Thr Asp Ala Ala  Lys Val Val
        995                 1000                1005

Glu Leu  Val Ser Thr Ala Leu  Asp Glu Thr Ile Asp  Leu Leu Pro
    1010                1015                1020

Thr Leu  Ser Glu Gly Leu Pro  Ile Ile Ala Thr Ile  Ile Asp Gly
    1025                1030                1035

Val Ser  Leu Gly Ala Ala Ile  Lys Glu Leu Ser Glu  Thr Ser Asp
    1040                1045                1050

Pro Leu  Leu Arg Gln Glu Ile  Glu Ala Lys Ile Gly  Ile Met Ala
    1055                1060                1065

Val Asn  Leu Thr Thr Ala Thr  Thr Ala Ile Ile Thr  Ser Ser Leu
    1070                1075                1080

Gly Val  Ala Ser Gly Phe Ser  Ile Leu Leu Val Pro  Leu Ala Gly
    1085                1090                1095
```

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```
Ile Ser  Ala Gly Ile Pro Ser  Leu Val Asn Asn Glu  Leu Val Leu
    1100                1105                1110

Arg Asp  Lys Ala Thr Lys Val  Val Asp Tyr Phe Lys  His Val Ser
    1115                1120                1125

Leu Val  Glu Thr Glu Gly Val  Phe Thr Leu Leu Asp  Asp Lys Ile
    1130                1135                1140

Met Met  Pro Gln Asp Asp Leu  Val Ile Ser Glu Ile  Asp Phe Asn
    1145                1150                1155

Asn Asn  Ser Ile Val Leu Gly  Lys Cys Glu Ile Trp  Arg Met Glu
    1160                1165                1170

Gly Gly  Ser Gly His Thr Val  Thr Asp Asp Ile Asp  His Phe Phe
    1175                1180                1185

Ser Ala  Pro Ser Ile Thr Tyr  Arg Glu Pro His Leu  Ser Ile Tyr
    1190                1195                1200

Asp Val  Leu Glu Val Gln Lys  Glu Glu Leu Asp Leu  Ser Lys Asp
    1205                1210                1215

Leu Met  Val Leu Pro Asn Ala  Pro Asn Arg Val Phe  Ala Trp Glu
    1220                1225                1230

Thr Gly  Trp Thr Pro Gly Leu  Arg Ser Leu Glu Asn  Asp Gly Thr
    1235                1240                1245

Lys Leu  Leu Asp Arg Ile Arg  Asp Asn Tyr Glu Gly  Glu Phe Tyr
    1250                1255                1260

Trp Arg  Tyr Phe Ala Phe Ile  Ala Asp Ala Leu Ile  Thr Thr Leu
    1265                1270                1275

Lys Pro  Arg Tyr Glu Asp Thr  Asn Ile Arg Ile Asn  Leu Asp Ser
    1280                1285                1290
```

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Asn Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile
1295 1300 1305

Arg Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr
1310 1315 1320

Ala Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu
1325 1330 1335

Ser Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg
1340 1345 1350

Asp Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile
1355 1360 1365

Glu Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile
1370 1375 1380

Leu Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser
1385 1390 1395

Asn Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn
1400 1405 1410

Ala Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu
1415 1420 1425

Ile Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile
1430 1435 1440

Gln Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys
1445 1450 1455

Asn Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly
1460 1465 1470

Phe Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu
1475 1480 1485

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```
Pro Asp  Val Val Leu Ile Ser  Lys Val Tyr Met Asp  Asp Ser Lys
    1490                1495                1500

Pro Ser  Phe Gly Tyr Tyr Ser  Asn Asn Leu Lys Asp  Val Lys Val
    1505                1510                1515

Ile Thr  Lys Asp Asn Val Asn  Ile Leu Thr Gly Tyr  Tyr Leu Lys
    1520                1525                1530

Asp Asp  Ile Lys Ile Ser Leu  Ser Leu Thr Leu Gln  Asp Glu Lys
    1535                1540                1545

Thr Ile  Lys Leu Asn Ser Val  His Leu Asp Glu Ser  Gly Val Ala
    1550                1555                1560

Glu Ile  Leu Lys Phe Met Asn  Arg Lys Gly Asn Thr  Asn Thr Ser
    1565                1570                1575

Asp Ser  Leu Met Ser Phe Leu  Glu Ser Met Asn Ile  Lys Ser Ile
    1580                1585                1590

Phe Val  Asn Phe Leu Gln Ser  Asn Ile Lys Phe Ile  Leu Asp Ala
    1595                1600                1605

Asn Phe  Ile Ile Ser Gly Thr  Thr Ser Ile Gly Gln  Phe Glu Phe
    1610                1615                1620

Ile Cys  Asp Glu Asn Asp Asn  Ile Gln Pro Tyr Phe  Ile Lys Phe
    1625                1630                1635

Asn Thr  Leu Glu Thr Asn Tyr  Thr Leu Tyr Val Gly  Asn Arg Gln
    1640                1645                1650

Asn Met  Ile Val Glu Pro Asn  Tyr Asp Leu Asp Asp  Ser Gly Asp
    1655                1660                1665

Ile Ser  Ser Thr Val Ile Asn  Phe Ser Gln Lys Tyr  Leu Tyr Gly
    1670                1675                1680
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Ile Asp  Ser Cys Val Asn Lys  Val Val Ile Ser Pro  Asn Ile Tyr
    1685                1690                1695

Thr Asp  Glu Ile Asn Ile Thr  Pro Val Tyr Glu Thr  Asn Asn Thr
    1700                1705                1710

Tyr Pro  Glu Val Ile Val Leu  Asp Ala Asn Tyr Ile  Asn Glu Lys
    1715                1720                1725

Ile Asn  Val Asn Ile Asn Asp  Leu Ser Ile Arg Tyr  Val Trp Ser
    1730                1735                1740

Asn Asp  Gly Asn Asp Phe Ile  Leu Met Ser Thr Ser  Glu Glu Asn
    1745                1750                1755

Lys Val  Ser Gln Val Lys Ile  Arg Phe Val Asn Val  Phe Lys Asp
    1760                1765                1770

Lys Thr  Leu Ala Asn Lys Leu  Ser Phe Asn Phe Ser  Asp Lys Gln
    1775                1780                1785

Asp Val  Pro Val Ser Glu Ile  Ile Leu Ser Phe Thr  Pro Ser Tyr
    1790                1795                1800

Tyr Glu  Asp Gly Leu Ile Gly  Tyr Asp Leu Gly Leu  Val Ser Leu
    1805                1810                1815

Tyr Asn  Glu Lys Phe Tyr Ile  Asn Asn Phe Gly Met  Met Val Ser
    1820                1825                1830

Gly Leu  Ile Tyr Ile Asn Asp  Ser Leu Tyr Tyr Phe  Lys Pro Pro
    1835                1840                1845

Val Asn  Asn Leu Ile Thr Gly  Phe Val Thr Val Gly  Asp Asp Lys
    1850                1855                1860

Tyr Tyr  Phe Asn Pro Ile Asn  Gly Gly Ala Ala Ser  Ile Gly Glu
    1865                1870                1875
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```
Thr Ile  Ile Asp Asp Lys Asn  Tyr Tyr Phe Asn Gln  Ser Gly Val
    1880                1885                1890

Leu Gln  Thr Gly Val Phe Ser  Thr Glu Asp Gly Phe  Lys Tyr Phe
    1895                1900                1905

Ala Pro  Ala Asn Thr Leu Asp  Glu Asn Leu Glu Gly  Glu Ala Ile
    1910                1915                1920

Asp Phe  Thr Gly Lys Leu Ile  Ile Asp Glu Asn Ile  Tyr Tyr Phe
    1925                1930                1935

Asp Asp  Asn Tyr Arg Gly Ala  Val Glu Trp Lys Glu  Leu Asp Gly
    1940                1945                1950

Glu Met  His Tyr Phe Ser Pro  Glu Thr Gly Lys Ala  Phe Lys Gly
    1955                1960                1965

Leu Asn  Gln Ile Gly Asp Tyr  Lys Tyr Tyr Phe Asn  Ser Asp Gly
    1970                1975                1980

Val Met  Gln Lys Gly Phe Val  Ser Ile Asn Asp Asn  Lys His Tyr
    1985                1990                1995

Phe Asp  Asp Ser Gly Val Met  Lys Val Gly Tyr Thr  Glu Ile Asp
    2000                2005                2010

Gly Lys  His Phe Tyr Phe Ala  Glu Asn Gly Glu Met  Gln Ile Gly
    2015                2020                2025

Val Phe  Asn Thr Glu Asp Gly  Phe Lys Tyr Phe Ala  His His Asn
    2030                2035                2040

Glu Asp  Leu Gly Asn Glu Glu  Gly Glu Glu Ile Ser  Tyr Ser Gly
    2045                2050                2055

Ile Leu  Asn Phe Asn Asn Lys  Ile Tyr Tyr Phe Asp  Asp Ser Phe
    2060                2065                2070
```

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```
Thr Ala  Val Val Gly Trp Lys  Asp Leu Glu Asp Gly  Ser Lys Tyr
    2075                2080                2085

Tyr Phe  Asp Glu Asp Thr Ala  Glu Ala Tyr Ile Gly  Leu Ser Leu
    2090                2095                2100

Ile Asn  Asp Gly Gln Tyr Tyr  Phe Asn Asp Asp Gly  Ile Met Gln
    2105                2110                2115

Val Gly  Phe Val Thr Ile Asn  Asp Lys Val Phe Tyr  Phe Ser Asp
    2120                2125                2130

Ser Gly  Ile Ile Glu Ser Gly  Val Gln Asn Ile Asp  Asp Asn Tyr
    2135                2140                2145

Phe Tyr  Ile Asp Asp Asn Gly  Ile Val Gln Ile Gly  Val Phe Asp
    2150                2155                2160

Thr Ser  Asp Gly Tyr Lys Tyr  Phe Ala Pro Ala Asn  Thr Val Asn
    2165                2170                2175

Asp Asn  Ile Tyr Gly Gln Ala  Val Glu Tyr Ser Gly  Leu Val Arg
    2180                2185                2190

Val Gly  Glu Asp Val Tyr Tyr  Phe Gly Glu Thr Tyr  Thr Ile Glu
    2195                2200                2205

Thr Gly  Trp Ile Tyr Asp Met  Glu Asn Glu Ser Asp  Lys Tyr Tyr
    2210                2215                2220

Phe Asn  Pro Glu Thr Lys Lys  Ala Cys Lys Gly Ile  Asn Leu Ile
    2225                2230                2235

Asp Asp  Ile Lys Tyr Tyr Phe  Asp Glu Lys Gly Ile  Met Arg Thr
    2240                2245                2250

Gly Leu  Ile Ser Phe Glu Asn  Asn Asn Tyr Tyr Phe  Asn Glu Asn
    2255                2260                2265
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Gly Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe
2270 2275 2280

Tyr Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr
2285 2290 2295

Pro Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu
2300 2305 2310

Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu
2315 2320 2325

Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr
2330 2335 2340

Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp
2345 2350 2355

Thr Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 160
<211> 2366
<212> PRT
<213> Clostridium difficile

<400> 160

Met Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg
1 5 10 15

Phe Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
20 25 30

Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
35 40 45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
50 55 60

Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val

65 70 75 80

Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys
85 90 95

Asn Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
100 105 110

Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
115 120 125

Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
130 135 140

Val Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145 150 155 160

Leu Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met
165 170 175

Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala
180 185 190

Gln Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr
195 200 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr
210 215 220

Ile Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val
225 230 235 240

Arg Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu
245 250 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu
260 265 270

Arg Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp

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275 280 285

Met Leu Pro Gly Ile Gln Pro Gly Leu Phe Glu Ser Ile Glu Lys Pro
290 295 300

Ser Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile
305 310 315 320

Met Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp
325 330 335

Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
340 345 350

Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala
355 360 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn
370 375 380

Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val
385 390 395 400

Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro
405 410 415

Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile
420 425 430

Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met
435 440 445

Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr
450 455 460

Thr Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp
465 470 475 480

Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala

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                485                 490                 495

Asp Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr
            500                 505                 510

Glu Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys
        515                 520                 525

Ala Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly
    530                 535                 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu
545                 550                 555                 560

Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly
                565                 570                 575

Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
            580                 585                 590

Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe
        595                 600                 605

Gln Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly
    610                 615                 620

Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile
625                 630                 635                 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp
                645                 650                 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser
            660                 665                 670

Thr Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro
        675                 680                 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser
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690 695 700

Ile Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys
705 710 715 720

Asp Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
725 730 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg
740 745 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
755 760 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
770 775 780

Asn Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785 790 795 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu
805 810 815

Glu Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
820 825 830

Asp Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr
835 840 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser
850 855 860

Ile Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp
865 870 875 880

Ser His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe
885 890 895

Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu

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            900                 905                 910

Thr Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu
        915                 920                 925

Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
    930                 935                 940

Val Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn
945                 950                 955                 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu
                965                 970                 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
            980                 985                 990

Leu Phe Ser Thr Gly Leu Asn Thr  Ile Thr Asp Ala Ala  Lys Val Val
        995                 1000                1005

Glu Leu  Val Ser Thr Ala Leu  Asp Glu Thr Ile Asp  Leu Leu Pro
    1010                1015                1020

Thr Leu  Ser Glu Gly Leu Pro  Ile Ile Ala Thr Ile  Ile Asp Gly
    1025                1030                1035

Val Ser  Leu Gly Ala Ala Ile  Lys Glu Leu Ser Glu  Thr Ser Asp
    1040                1045                1050

Pro Leu  Leu Arg Gln Glu Ile  Glu Ala Lys Ile Gly  Ile Met Ala
    1055                1060                1065

Val Asn  Leu Thr Thr Ala Thr  Thr Ala Ile Ile Thr  Ser Ser Leu
    1070                1075                1080

Gly Val  Ala Ser Gly Phe Ser  Ile Leu Leu Val Pro  Leu Ala Gly
    1085                1090                1095

Ile Ser  Ala Gly Ile Pro Ser  Leu Val Asn Asn Glu  Leu Val Leu
```

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1100 1105 1110

Arg Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Val Ser
1115 1120 1125

Leu Val Glu Thr Glu Gly Val Phe Thr Leu Leu Asp Asp Lys Ile
1130 1135 1140

Met Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn
1145 1150 1155

Asn Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu
1160 1165 1170

Gly Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe
1175 1180 1185

Ser Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr
1190 1195 1200

Asp Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp
1205 1210 1215

Leu Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu
1220 1225 1230

Thr Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr
1235 1240 1245

Lys Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr
1250 1255 1260

Trp Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu
1265 1270 1275

Lys Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser
1280 1285 1290

Asn Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile

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    1295                1300                1305

Arg Glu  Lys Leu Ser Tyr Ser  Phe Tyr Gly Ser Gly  Gly Thr Tyr
    1310                1315                1320

Ala Leu  Ser Leu Ser Gln Tyr  Asn Met Gly Ile Asn  Ile Glu Leu
    1325                1330                1335

Ser Glu  Ser Asp Val Trp Ile  Ile Asp Val Asp Asn  Val Val Arg
    1340                1345                1350

Asp Val  Thr Ile Glu Ser Asp  Lys Ile Lys Lys Gly  Asp Leu Ile
    1355                1360                1365

Glu Gly  Ile Leu Ser Thr Leu  Ser Ile Glu Glu Asn  Lys Ile Ile
    1370                1375                1380

Leu Asn  Ser His Glu Ile Asn  Phe Ser Gly Glu Val  Asn Gly Ser
    1385                1390                1395

Asn Gly  Phe Val Ser Leu Thr  Phe Ser Ile Leu Glu  Gly Ile Asn
    1400                1405                1410

Ala Ile  Ile Glu Val Asp Leu  Leu Ser Lys Ser Tyr  Lys Leu Leu
    1415                1420                1425

Ile Ser  Gly Glu Leu Lys Ile  Leu Met Leu Asn Ser  Asn His Ile
    1430                1435                1440

Gln Gln  Lys Ile Asp Tyr Ile  Gly Phe Asn Ser Glu  Leu Gln Lys
    1445                1450                1455

Asn Ile  Pro Tyr Ser Phe Val  Asp Ser Glu Gly Lys  Glu Asn Gly
    1460                1465                1470

Phe Ile  Asn Gly Ser Thr Lys  Glu Gly Leu Phe Val  Ser Glu Leu
    1475                1480                1485

Pro Asp  Val Val Leu Ile Ser  Lys Val Tyr Met Asp  Asp Ser Lys
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1490 1495 1500

Pro Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val
1505 1510 1515

Ile Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys
1520 1525 1530

Asp Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys
1535 1540 1545

Thr Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala
1550 1555 1560

Glu Ile Leu Lys Phe Met Asn Arg Lys Gly Asn Thr Asn Thr Ser
1565 1570 1575

Asp Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile
1580 1585 1590

Phe Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala
1595 1600 1605

Asn Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe
1610 1615 1620

Ile Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe
1625 1630 1635

Asn Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln
1640 1645 1650

Asn Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp
1655 1660 1665

Ile Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly
1670 1675 1680

Ile Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr

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1685 1690 1695

Thr Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr
1700 1705 1710

Tyr Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys
1715 1720 1725

Ile Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser
1730 1735 1740

Asn Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn
1745 1750 1755

Lys Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp
1760 1765 1770

Lys Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln
1775 1780 1785

Asp Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr
1790 1795 1800

Tyr Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu
1805 1810 1815

Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser
1820 1825 1830

Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro
1835 1840 1845

Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys
1850 1855 1860

Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu
1865 1870 1875

Thr Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val

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1880 1885 1890

Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
1895 1900 1905

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile
1910 1915 1920

Asp Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe
1925 1930 1935

Asp Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly
1940 1945 1950

Glu Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly
1955 1960 1965

Leu Asn Gln Ile Gly Asp Tyr Lys Tyr Tyr Phe Asn Ser Asp Gly
1970 1975 1980

Val Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr
1985 1990 1995

Phe Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp
2000 2005 2010

Gly Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly
2015 2020 2025

Val Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn
2030 2035 2040

Glu Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly
2045 2050 2055

Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe
2060 2065 2070

Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr

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2075 2080 2085

Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu
2090 2095 2100

Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln
2105 2110 2115

Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp
2120 2125 2130

Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
2135 2140 2145

Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp
2150 2155 2160

Thr Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn
2165 2170 2175

Asp Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg
2180 2185 2190

Val Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu
2195 2200 2205

Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile
2225 2230 2235

Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr
2240 2245 2250

Gly Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn
2255 2260 2265

Gly Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe

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2270 2275 2280

Tyr Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr
2285 2290 2295

Pro Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu
2300 2305 2310

Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu
2315 2320 2325

Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr
2330 2335 2340

Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp
2345 2350 2355

Thr Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 161
<211> 2366
<212> PRT
<213> Clostridium difficile

<400> 161

Met Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg
1 5 10 15

Phe Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
20 25 30

Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
35 40 45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
50 55 60

Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65 70 75 80

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```
Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys
                85                  90                  95

Asn Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
            100                 105                 110

Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
        115                 120                 125

Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
    130                 135                 140

Val Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145                 150                 155                 160

Leu Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met
                165                 170                 175

Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala
            180                 185                 190

Gln Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr
        195                 200                 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr
    210                 215                 220

Ile Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val
225                 230                 235                 240

Arg Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu
                245                 250                 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu
            260                 265                 270

Arg Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp
        275                 280                 285
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```
Met Leu Pro Gly Ile Gln Pro Gly Leu Phe Glu Ser Ile Glu Lys Pro
    290                 295                 300

Ser Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile
305                 310                 315                 320

Met Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp
                325                 330                 335

Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
            340                 345                 350

Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala
        355                 360                 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn
    370                 375                 380

Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val
385                 390                 395                 400

Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro
                405                 410                 415

Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile
            420                 425                 430

Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met
        435                 440                 445

Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr
    450                 455                 460

Thr Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp
465                 470                 475                 480

Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala
                485                 490                 495
```

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```
Asp Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr
            500                 505                 510

Glu Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys
        515                 520                 525

Ala Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly
    530                 535                 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu
545                 550                 555                 560

Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly
                565                 570                 575

Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
            580                 585                 590

Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe
        595                 600                 605

Gln Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly
    610                 615                 620

Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile
625                 630                 635                 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp
                645                 650                 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser
            660                 665                 670

Thr Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro
        675                 680                 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser
    690                 695                 700
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```
Ile Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys
705                 710                 715                 720

Asp Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
                725                 730                 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg
            740                 745                 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
        755                 760                 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
    770                 775                 780

Asn Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785                 790                 795                 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu
                805                 810                 815

Glu Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
            820                 825                 830

Asp Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr
        835                 840                 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser
    850                 855                 860

Ile Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp
865                 870                 875                 880

Ser His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe
                885                 890                 895

Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
            900                 905                 910
```

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```
Thr Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu
        915                 920                 925

Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
    930                 935                 940

Val Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn
945                 950                 955                 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu
                965                 970                 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
            980                 985                 990

Leu Phe Ser Thr Gly Leu Asn Thr  Ile Thr Asp Ala Ala  Lys Val Val
        995                 1000                1005

Glu Leu  Val Ser Thr Ala Leu  Asp Glu Thr Ile Asp  Leu Leu Pro
    1010                1015                1020

Thr Leu  Ser Glu Gly Leu Pro  Ile Ile Ala Thr Ile  Ile Asp Gly
    1025                1030                1035

Val Ser  Leu Gly Ala Ala Ile  Lys Glu Leu Ser Glu  Thr Ser Asp
    1040                1045                1050

Pro Leu  Leu Arg Gln Glu Ile  Glu Ala Lys Ile Gly  Ile Met Ala
    1055                1060                1065

Val Asn  Leu Thr Thr Ala Thr  Thr Ala Ile Ile Thr  Ser Ser Leu
    1070                1075                1080

Gly Val  Ala Ser Gly Phe Ser  Ile Leu Leu Val Pro  Leu Ala Gly
    1085                1090                1095

Ile Ser  Ala Gly Ile Pro Ser  Leu Val Asn Asn Glu  Leu Val Leu
    1100                1105                1110
```

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Arg Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Val Ser
1115 1120 1125

Leu Val Glu Thr Glu Gly Val Phe Thr Leu Leu Asp Asp Lys Ile
1130 1135 1140

Met Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn
1145 1150 1155

Asn Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu
1160 1165 1170

Gly Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe
1175 1180 1185

Ser Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr
1190 1195 1200

Asp Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp
1205 1210 1215

Leu Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu
1220 1225 1230

Thr Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr
1235 1240 1245

Lys Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr
1250 1255 1260

Trp Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu
1265 1270 1275

Lys Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser
1280 1285 1290

Asn Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile
1295 1300 1305

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```
Arg Glu  Lys Leu Ser Tyr Ser  Phe Tyr Gly Ser Gly  Gly Thr Tyr
    1310                1315                1320

Ala Leu  Ser Leu Ser Gln Tyr  Asn Met Gly Ile Asn  Ile Glu Leu
    1325                1330                1335

Ser Glu  Ser Asp Val Trp Ile  Ile Asp Val Asp Asn  Val Val Arg
    1340                1345                1350

Asp Val  Thr Ile Glu Ser Asp  Lys Ile Lys Lys Gly  Asp Leu Ile
    1355                1360                1365

Glu Gly  Ile Leu Ser Thr Leu  Ser Ile Glu Glu Asn  Lys Ile Ile
    1370                1375                1380

Leu Asn  Ser His Glu Ile Asn  Phe Ser Gly Glu Val  Asn Gly Ser
    1385                1390                1395

Asn Gly  Phe Val Ser Leu Thr  Phe Ser Ile Leu Glu  Gly Ile Asn
    1400                1405                1410

Ala Ile  Ile Glu Val Asp Leu  Leu Ser Lys Ser Tyr  Lys Leu Leu
    1415                1420                1425

Ile Ser  Gly Glu Leu Lys Ile  Leu Met Leu Asn Ser  Asn His Ile
    1430                1435                1440

Gln Gln  Lys Ile Asp Tyr Ile  Gly Phe Asn Ser Glu  Leu Gln Lys
    1445                1450                1455

Asn Ile  Pro Tyr Ser Phe Val  Asp Ser Glu Gly Lys  Glu Asn Gly
    1460                1465                1470

Phe Ile  Asn Gly Ser Thr Lys  Glu Gly Leu Phe Val  Ser Glu Leu
    1475                1480                1485

Pro Asp  Val Val Leu Ile Ser  Lys Val Tyr Met Asp  Asp Ser Lys
    1490                1495                1500
```

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```
Pro Ser  Phe Gly Tyr Tyr Ser  Asn Asn Leu Lys Asp  Val Lys Val
    1505                1510                1515

Ile Thr  Lys Asp Asn Val Asn  Ile Leu Thr Gly Tyr  Tyr Leu Lys
    1520                1525                1530

Asp Asp  Ile Lys Ile Ser Leu  Ser Leu Thr Leu Gln  Asp Glu Lys
    1535                1540                1545

Thr Ile  Lys Leu Asn Ser Val  His Leu Asp Glu Ser  Gly Val Ala
    1550                1555                1560

Glu Ile  Leu Lys Phe Met Asn  Arg Lys Gly Asn Thr  Asn Thr Ser
    1565                1570                1575

Asp Ser  Leu Met Ser Phe Leu  Glu Ser Met Asn Ile  Lys Ser Ile
    1580                1585                1590

Phe Val  Asn Phe Leu Gln Ser  Asn Ile Lys Phe Ile  Leu Asp Ala
    1595                1600                1605

Asn Phe  Ile Ile Ser Gly Thr  Thr Ser Ile Gly Gln  Phe Glu Phe
    1610                1615                1620

Ile Cys  Asp Glu Asn Asp Asn  Ile Gln Pro Tyr Phe  Ile Lys Phe
    1625                1630                1635

Asn Thr  Leu Glu Thr Asn Tyr  Thr Leu Tyr Val Gly  Asn Arg Gln
    1640                1645                1650

Asn Met  Ile Val Glu Pro Asn  Tyr Asp Leu Asp Asp  Ser Gly Asp
    1655                1660                1665

Ile Ser  Ser Thr Val Ile Asn  Phe Ser Gln Lys Tyr  Leu Tyr Gly
    1670                1675                1680

Ile Asp  Ser Cys Val Asn Lys  Val Val Ile Ser Pro  Asn Ile Tyr
    1685                1690                1695
```

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Thr Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr
1700 1705 1710

Tyr Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys
1715 1720 1725

Ile Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser
1730 1735 1740

Asn Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn
1745 1750 1755

Lys Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp
1760 1765 1770

Lys Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln
1775 1780 1785

Asp Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr
1790 1795 1800

Tyr Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu
1805 1810 1815

Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser
1820 1825 1830

Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro
1835 1840 1845

Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys
1850 1855 1860

Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu
1865 1870 1875

Thr Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val
1880 1885 1890

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```
Leu Gln  Thr Gly Val Phe Ser  Thr Glu Asp Gly Phe  Lys Tyr Phe
    1895                1900                1905

Ala Pro  Ala Asn Thr Leu Asp  Glu Asn Leu Glu Gly  Glu Ala Ile
    1910                1915                1920

Asp Phe  Thr Gly Lys Leu Ile  Ile Asp Glu Asn Ile  Tyr Tyr Phe
    1925                1930                1935

Asp Asp  Asn Tyr Arg Gly Ala  Val Glu Trp Lys Glu  Leu Asp Gly
    1940                1945                1950

Glu Met  His Tyr Phe Ser Pro  Glu Thr Gly Lys Ala  Phe Lys Gly
    1955                1960                1965

Leu Asn  Gln Ile Gly Asp Tyr  Lys Tyr Tyr Phe Asn  Ser Asp Gly
    1970                1975                1980

Val Met  Gln Lys Gly Phe Val  Ser Ile Asn Asp Asn  Lys His Tyr
    1985                1990                1995

Phe Asp  Asp Ser Gly Val Met  Lys Val Gly Tyr Thr  Glu Ile Asp
    2000                2005                2010

Gly Lys  His Phe Tyr Phe Ala  Glu Asn Gly Glu Met  Gln Ile Gly
    2015                2020                2025

Val Phe  Asn Thr Glu Asp Gly  Phe Lys Tyr Phe Ala  His His Asn
    2030                2035                2040

Glu Asp  Leu Gly Asn Glu Glu  Gly Glu Glu Ile Ser  Tyr Ser Gly
    2045                2050                2055

Ile Leu  Asn Phe Asn Asn Lys  Ile Tyr Tyr Phe Asp  Asp Ser Phe
    2060                2065                2070

Thr Ala  Val Val Gly Trp Lys  Asp Leu Glu Asp Gly  Ser Lys Tyr
    2075                2080                2085
```

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Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu
2090 2095 2100

Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln
2105 2110 2115

Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp
2120 2125 2130

Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
2135 2140 2145

Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp
2150 2155 2160

Thr Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn
2165 2170 2175

Asp Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg
2180 2185 2190

Val Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu
2195 2200 2205

Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile
2225 2230 2235

Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr
2240 2245 2250

Gly Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn
2255 2260 2265

Gly Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe
2270 2275 2280

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Tyr Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr
2285 2290 2295

Pro Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu
2300 2305 2310

Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu
2315 2320 2325

Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr
2330 2335 2340

Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp
2345 2350 2355

Thr Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 162
<211> 2366
<212> PRT
<213> Clostridium difficile

<400> 162

Met Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg
1 5 10 15

Phe Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
20 25 30

Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
35 40 45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
50 55 60

Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65 70 75 80

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```
Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys
                85                  90                  95

Asn Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
            100                 105                 110

Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
        115                 120                 125

Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
    130                 135                 140

Val Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145                 150                 155                 160

Leu Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met
                165                 170                 175

Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala
            180                 185                 190

Gln Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr
        195                 200                 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr
    210                 215                 220

Ile Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val
225                 230                 235                 240

Arg Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu
                245                 250                 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu
            260                 265                 270

Arg Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp
        275                 280                 285
```

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```
Met Leu Pro Gly Ile Gln Pro Gly Leu Phe Glu Ser Ile Glu Lys Pro
    290                 295                 300

Ser Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile
305                 310                 315                 320

Met Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp
                325                 330                 335

Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
            340                 345                 350

Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala
        355                 360                 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn
    370                 375                 380

Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val
385                 390                 395                 400

Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro
                405                 410                 415

Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile
            420                 425                 430

Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met
        435                 440                 445

Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr
    450                 455                 460

Thr Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp
465                 470                 475                 480

Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala
                485                 490                 495
```

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```
Asp Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr
            500                 505                 510

Glu Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys
        515                 520                 525

Ala Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly
    530                 535                 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu
545                 550                 555                 560

Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly
                565                 570                 575

Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
            580                 585                 590

Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe
        595                 600                 605

Gln Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly
    610                 615                 620

Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile
625                 630                 635                 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp
                645                 650                 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser
            660                 665                 670

Thr Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro
        675                 680                 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser
    690                 695                 700
```

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```
Ile Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys
705                 710                 715                 720

Asp Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
                725                 730                 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg
            740                 745                 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
        755                 760                 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
    770                 775                 780

Asn Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785                 790                 795                 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu
                805                 810                 815

Glu Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
            820                 825                 830

Asp Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr
        835                 840                 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser
    850                 855                 860

Ile Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp
865                 870                 875                 880

Ser His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe
                885                 890                 895

Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
            900                 905                 910
```

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```
Thr Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu
        915                 920                 925

Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
    930                 935                 940

Val Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn
945                 950                 955                 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu
                965                 970                 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
            980                 985                 990

Leu Phe Ser Thr Gly Leu Asn Thr  Ile Thr Asp Ala Ala  Lys Val Val
        995                 1000                1005

Glu Leu  Val Ser Thr Ala Leu  Asp Glu Thr Ile Asp  Leu Leu Pro
    1010                1015                1020

Thr Leu  Ser Glu Gly Leu Pro  Ile Ile Ala Thr Ile  Ile Asp Gly
    1025                1030                1035

Val Ser  Leu Gly Ala Ala Ile  Lys Glu Leu Ser Glu  Thr Ser Asp
    1040                1045                1050

Pro Leu  Leu Arg Gln Glu Ile  Glu Ala Lys Ile Gly  Ile Met Ala
    1055                1060                1065

Val Asn  Leu Thr Thr Ala Thr  Thr Ala Ile Ile Thr  Ser Ser Leu
    1070                1075                1080

Gly Val  Ala Ser Gly Phe Ser  Ile Leu Leu Val Pro  Leu Ala Gly
    1085                1090                1095

Ile Ser  Ala Gly Ile Pro Ser  Leu Val Asn Asn Glu  Leu Val Leu
    1100                1105                1110
```

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Arg Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Val Ser
1115 1120 1125

Leu Val Glu Thr Glu Gly Val Phe Thr Leu Leu Asp Asp Lys Ile
1130 1135 1140

Met Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn
1145 1150 1155

Asn Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu
1160 1165 1170

Gly Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe
1175 1180 1185

Ser Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr
1190 1195 1200

Asp Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp
1205 1210 1215

Leu Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu
1220 1225 1230

Thr Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr
1235 1240 1245

Lys Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr
1250 1255 1260

Trp Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu
1265 1270 1275

Lys Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser
1280 1285 1290

Asn Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile
1295 1300 1305

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```
Arg Glu  Lys Leu Ser Tyr Ser  Phe Tyr Gly Ser Gly  Gly Thr Tyr
    1310                1315                1320

Ala Leu  Ser Leu Ser Gln Tyr  Asn Met Gly Ile Asn  Ile Glu Leu
    1325                1330                1335

Ser Glu  Ser Asp Val Trp Ile  Ile Asp Val Asp Asn  Val Val Arg
    1340                1345                1350

Asp Val  Thr Ile Glu Ser Asp  Lys Ile Lys Lys Gly  Asp Leu Ile
    1355                1360                1365

Glu Gly  Ile Leu Ser Thr Leu  Ser Ile Glu Glu Asn  Lys Ile Ile
    1370                1375                1380

Leu Asn  Ser His Glu Ile Asn  Phe Ser Gly Glu Val  Asn Gly Ser
    1385                1390                1395

Asn Gly  Phe Val Ser Leu Thr  Phe Ser Ile Leu Glu  Gly Ile Asn
    1400                1405                1410

Ala Ile  Ile Glu Val Asp Leu  Leu Ser Lys Ser Tyr  Lys Leu Leu
    1415                1420                1425

Ile Ser  Gly Glu Leu Lys Ile  Leu Met Leu Asn Ser  Asn His Ile
    1430                1435                1440

Gln Gln  Lys Ile Asp Tyr Ile  Gly Phe Asn Ser Glu  Leu Gln Lys
    1445                1450                1455

Asn Ile  Pro Tyr Ser Phe Val  Asp Ser Glu Gly Lys  Glu Asn Gly
    1460                1465                1470

Phe Ile  Asn Gly Ser Thr Lys  Glu Gly Leu Phe Val  Ser Glu Leu
    1475                1480                1485

Pro Asp  Val Val Leu Ile Ser  Lys Val Tyr Met Asp  Asp Ser Lys
    1490                1495                1500
```

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Pro Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val
1505 1510 1515

Ile Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys
1520 1525 1530

Asp Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys
1535 1540 1545

Thr Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala
1550 1555 1560

Glu Ile Leu Lys Phe Met Asn Arg Lys Gly Asn Thr Asn Thr Ser
1565 1570 1575

Asp Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile
1580 1585 1590

Phe Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala
1595 1600 1605

Asn Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe
1610 1615 1620

Ile Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe
1625 1630 1635

Asn Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln
1640 1645 1650

Asn Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp
1655 1660 1665

Ile Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly
1670 1675 1680

Ile Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr
1685 1690 1695

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```
Thr Asp  Glu Ile Asn Ile Thr  Pro Val Tyr Glu Thr  Asn Asn Thr
    1700                1705                1710

Tyr Pro  Glu Val Ile Val Leu  Asp Ala Asn Tyr Ile  Asn Glu Lys
    1715                1720                1725

Ile Asn  Val Asn Ile Asn Asp  Leu Ser Ile Arg Tyr  Val Trp Ser
    1730                1735                1740

Asn Asp  Gly Asn Asp Phe Ile  Leu Met Ser Thr Ser  Glu Glu Asn
    1745                1750                1755

Lys Val  Ser Gln Val Lys Ile  Arg Phe Val Asn Val  Phe Lys Asp
    1760                1765                1770

Lys Thr  Leu Ala Asn Lys Leu  Ser Phe Asn Phe Ser  Asp Lys Gln
    1775                1780                1785

Asp Val  Pro Val Ser Glu Ile  Ile Leu Ser Phe Thr  Pro Ser Tyr
    1790                1795                1800

Tyr Glu  Asp Gly Leu Ile Gly  Tyr Asp Leu Gly Leu  Val Ser Leu
    1805                1810                1815

Tyr Asn  Glu Lys Phe Tyr Ile  Asn Asn Phe Gly Met  Met Val Ser
    1820                1825                1830

Gly Leu  Ile Tyr Ile Asn Asp  Ser Leu Tyr Tyr Phe  Lys Pro Pro
    1835                1840                1845

Val Asn  Asn Leu Ile Thr Gly  Phe Val Thr Val Gly  Asp Asp Lys
    1850                1855                1860

Tyr Tyr  Phe Asn Pro Ile Asn  Gly Gly Ala Ala Ser  Ile Gly Glu
    1865                1870                1875

Thr Ile  Ile Asp Asp Lys Asn  Tyr Tyr Phe Asn Gln  Ser Gly Val
    1880                1885                1890
```

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Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
1895 1900 1905

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile
1910 1915 1920

Asp Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe
1925 1930 1935

Asp Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly
1940 1945 1950

Glu Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly
1955 1960 1965

Leu Asn Gln Ile Gly Asp Tyr Lys Tyr Tyr Phe Asn Ser Asp Gly
1970 1975 1980

Val Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr
1985 1990 1995

Phe Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp
2000 2005 2010

Gly Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly
2015 2020 2025

Val Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn
2030 2035 2040

Glu Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly
2045 2050 2055

Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe
2060 2065 2070

Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr
2075 2080 2085

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Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu
2090 2095 2100

Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln
2105 2110 2115

Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp
2120 2125 2130

Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
2135 2140 2145

Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp
2150 2155 2160

Thr Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn
2165 2170 2175

Asp Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg
2180 2185 2190

Val Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu
2195 2200 2205

Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile
2225 2230 2235

Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr
2240 2245 2250

Gly Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn
2255 2260 2265

Gly Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe
2270 2275 2280

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Tyr Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr
2285 2290 2295

Pro Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu
2300 2305 2310

Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu
2315 2320 2325

Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr
2330 2335 2340

Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp
2345 2350 2355

Thr Ala Gln Leu Val Ile Ser Glu
2360 2365

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<211> 2366
<212> PRT
<213> Clostridium difficile

<400> 163

Met Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg
1 5 10 15

Phe Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
20 25 30

Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
35 40 45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
50 55 60

Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65 70 75 80

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```
Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys
                85                  90                  95

Asn Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
            100                 105                 110

Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
        115                 120                 125

Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
    130                 135                 140

Ile Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145                 150                 155                 160

Leu Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met
                165                 170                 175

Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala
            180                 185                 190

Gln Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile
        195                 200                 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr
    210                 215                 220

Ile Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val
225                 230                 235                 240

Arg Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu
                245                 250                 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu
            260                 265                 270

Arg Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp
        275                 280                 285
```

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```
Met Leu Pro Gly Ile Gln Pro Gly Leu Phe Glu Ser Ile Glu Lys Pro
    290                 295                 300

Ser Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile
305                 310                 315                 320

Met Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp
                325                 330                 335

Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser
            340                 345                 350

Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala
        355                 360                 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn
    370                 375                 380

Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val
385                 390                 395                 400

Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro
                405                 410                 415

Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile
            420                 425                 430

Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met
        435                 440                 445

Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr
    450                 455                 460

Thr Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp
465                 470                 475                 480

Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala
                485                 490                 495
```

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```
Asp Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr
            500                 505                 510

Glu Gln Glu Met Ala Ser Leu Trp Thr Phe Asp Asp Ala Arg Ala Lys
        515                 520                 525

Val Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly
    530                 535                 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu
545                 550                 555                 560

Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly
                565                 570                 575

Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
            580                 585                 590

Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Ile Leu Phe
        595                 600                 605

Gln Lys Asn Ile Glu Asn Ser Glu Val Ala Tyr Tyr Tyr Asn Pro Gly
    610                 615                 620

Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Arg Ile Pro Ser Ile Ile
625                 630                 635                 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp
                645                 650                 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser
            660                 665                 670

Thr Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Ser
        675                 680                 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser
    690                 695                 700
```

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```
Ile Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys
705                 710                 715                 720

Asp Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
                725                 730                 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Asn Glu Gly Arg Arg
            740                 745                 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
        755                 760                 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
    770                 775                 780

Asn Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785                 790                 795                 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Leu Ser Asp Ile Glu Leu Glu
                805                 810                 815

Glu Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
            820                 825                 830

Asp Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr
        835                 840                 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser
    850                 855                 860

Ile Ser Asp Ser Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Asp Asp
865                 870                 875                 880

Ser His Phe Ile Ser Phe Glu Asp Ile Ser Lys Thr Glu Asp Gly Phe
                885                 890                 895

Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
            900                 905                 910
```

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```
Thr Glu Lys Glu Ile Phe Ser Glu Tyr Ala Asn His Ile Arg Gly Glu
        915                 920                 925

Ile Ser Asn Ile Lys Asp Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
    930                 935                 940

Val Lys Lys Val Asn Leu Asp Ala Ile His Glu Val Asn Thr Leu Asn
945                 950                 955                 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Gly Tyr Ser Ser Ser Lys Glu
                965                 970                 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
            980                 985                 990

Leu Phe Ser Thr Gly Leu Asn Thr  Ile Thr Asp Ala Ala  Lys Val Val
        995                 1000                1005

Glu Leu  Val Ser Thr Ala Leu  Asp Glu Thr Ile Asp  Leu Leu Pro
    1010                1015                1020

Thr Leu  Ser Glu Gly Leu Pro  Val Ile Ala Thr Ile  Ile Asp Gly
    1025                1030                1035

Val Ser  Leu Gly Ala Ala Ile  Lys Glu Leu Ser Glu  Thr Ser Asp
    1040                1045                1050

Pro Leu  Leu Arg Gln Glu Ile  Glu Ala Lys Ile Gly  Ile Met Ala
    1055                1060                1065

Val Asn  Leu Thr Ala Ala Thr  Thr Ala Ile Ile Thr  Ser Ser Leu
    1070                1075                1080

Gly Val  Ala Ser Gly Phe Ser  Ile Leu Leu Val Pro  Leu Ala Gly
    1085                1090                1095

Ile Ser  Ala Gly Ile Pro Ser  Leu Val Asn Asn Glu  Leu Val Leu
    1100                1105                1110
```

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```
Arg Asp  Lys Ala Thr Lys Val  Val Asp Tyr Phe Lys  His Ile Ser
    1115                1120                1125

Leu Val  Glu Thr Glu Gly Ala  Phe Thr Leu Leu Asp  Asp Lys Ile
    1130                1135                1140

Met Ile  Pro Gln Asp Asp Leu  Val Ile Ser Glu Ile  Asp Phe Asn
    1145                1150                1155

Asn Asn  Ser Ile Val Leu Gly  Lys Cys Glu Ile Trp  Arg Met Glu
    1160                1165                1170

Gly Gly  Ser Gly His Thr Val  Thr Asn Asp Ile Asp  His Phe Phe
    1175                1180                1185

Ser Ser  Pro Thr Ile Thr Tyr  Ile Lys Pro His Leu  Ser Ile Tyr
    1190                1195                1200

Asp Val  Leu Glu Val Gln Lys  Glu Glu Leu Asp Leu  Ser Lys Asp
    1205                1210                1215

Leu Met  Val Leu Pro Asn Ala  Pro Asn Arg Val Phe  Ala Trp Glu
    1220                1225                1230

Thr Gly  Trp Thr Pro Gly Leu  Arg Ser Leu Glu Asn  Glu Gly Thr
    1235                1240                1245

Lys Leu  Leu Asp Arg Ile Arg  Asp His Tyr Lys Gly  Glu Phe Tyr
    1250                1255                1260

Trp Arg  Tyr Phe Ala Phe Ile  Ala Asp Ala Leu Ile  Thr Thr Leu
    1265                1270                1275

Lys Pro  Arg Tyr Glu Asp Thr  Asn Ile Arg Ile Asn  Leu Asp Ser
    1280                1285                1290

Asn Asn  Arg Ser Phe Ile Val  Pro Ile Ile Thr Thr  Glu His Ile
    1295                1300                1305
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Arg Glu Lys Leu Ser Tyr Ser Phe His Gly Ser Gly Gly Thr Tyr
1310 1315 1320

Ala Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu
1325 1330 1335

Ser Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg
1340 1345 1350

Asp Val Thr Ile Asp Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile
1355 1360 1365

Glu Gly Ile Leu Ser Thr Leu Ser Ile Glu Asp Asn Lys Ile Ile
1370 1375 1380

Leu Asn His His Glu Ile Asn Phe Ser Gly Asp Val Asn Gly Ser
1385 1390 1395

Asn Gly Phe Ile Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn
1400 1405 1410

Ala Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu
1415 1420 1425

Ile Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile
1430 1435 1440

Gln Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys
1445 1450 1455

Asn Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly
1460 1465 1470

Phe Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu
1475 1480 1485

Pro Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys
1490 1495 1500

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Pro Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val
1505 1510 1515

Ile Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys
1520 1525 1530

Asp Asp Ile Lys Ile Ser Leu Ser Phe Thr Leu Gln Asp Glu Lys
1535 1540 1545

Thr Ile Lys Leu Asn Gly Val His Leu Asp Glu Ser Gly Val Ala
1550 1555 1560

Glu Ile Leu Lys Phe Met Asn Lys Lys Gly Ser Thr Asn Thr Ser
1565 1570 1575

Asp Ser Leu Met Ser Phe Leu Glu Ser Val Asn Ile Lys Ser Ile
1580 1585 1590

Phe Val Asn Phe Leu Gln Ser Lys Ile Asn Phe Ile Leu Asp Ala
1595 1600 1605

Asn Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe
1610 1615 1620

Ile Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe
1625 1630 1635

Asn Thr Leu Glu Thr Thr Tyr Thr Leu Tyr Val Gly Asn Arg Gln
1640 1645 1650

Asn Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp
1655 1660 1665

Ile Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly
1670 1675 1680

Ile Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr
1685 1690 1695

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```
Thr Asp  Glu Ile Asn Ile Thr  Pro Val Tyr Glu Thr  Asn Asn Asn
    1700                1705                1710

Tyr Pro  Glu Val Ile Val Leu  Asp Ala Asn Tyr Ile  Asn Glu Lys
    1715                1720                1725

Ile Asn  Val Asn Ile Asn Asp  Leu Ser Ile Arg Tyr  Val Trp Ser
    1730                1735                1740

Asn Asp  Gly Asn Asp Phe Ile  Leu Met Ser Thr Ser  Glu Glu Asn
    1745                1750                1755

Lys Val  Ser Gln Val Lys Ile  Arg Phe Val Asn Val  Phe Lys Asp
    1760                1765                1770

Lys Thr  Leu Ala Asn Lys Leu  Ser Phe Asn Phe Ser  Asp Lys Gln
    1775                1780                1785

Asp Val  Pro Val Ser Glu Ile  Ile Ser Ala Phe Thr  Pro Ser Tyr
    1790                1795                1800

Tyr Glu  Asp Gly Leu Ile Gly  Tyr Asp Leu Gly Leu  Val Ser Leu
    1805                1810                1815

Tyr Asn  Glu Lys Phe Tyr Ile  Asn Asn Phe Gly Met  Met Val Ser
    1820                1825                1830

Gly Leu  Ile Tyr Ile Asn Asp  Ser Leu Tyr Tyr Phe  Lys Pro Pro
    1835                1840                1845

Val Asn  Asn Leu Ile Thr Gly  Phe Val Thr Val Gly  Asp Asp Lys
    1850                1855                1860

Tyr Tyr  Phe Asn Pro Thr Asn  Gly Gly Ala Ala Ser  Ile Gly Glu
    1865                1870                1875

Thr Ile  Ile Asn Asp Lys Asn  Tyr Tyr Phe Asn Gln  Ser Gly Ile
    1880                1885                1890
```

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```
Leu Gln  Thr Gly Val Phe Ser  Thr Glu Asp Gly Leu  Lys Tyr Phe
    1895                1900                1905

Ala Pro  Ala Asn Thr Leu Asp  Glu Asn Leu Glu Gly  Glu Ala Ile
    1910                1915                1920

Asp Phe  Thr Gly Lys Leu Ile  Ile Asp Glu Asn Ile  Tyr Tyr Phe
    1925                1930                1935

Glu Asp  Asn Tyr Arg Gly Ala  Val Glu Trp Lys Glu  Leu Asp Gly
    1940                1945                1950

Glu Met  Tyr Tyr Phe Ser Pro  Glu Thr Gly Lys Ala  Phe Lys Gly
    1955                1960                1965

Leu Asn  Gln Ile Gly Asp Asp  Lys Tyr Tyr Phe Asn  Ser Asp Gly
    1970                1975                1980

Ile Met  Gln Lys Gly Phe Val  Ser Ile Asn Asp Lys  Lys Tyr Tyr
    1985                1990                1995

Phe Asp  Asp Ser Gly Val Met  Lys Val Gly Tyr Ile  Glu Ile Asp
    2000                2005                2010

Gly Lys  Tyr Phe Tyr Phe Ala  Glu Asn Gly Glu Met  Gln Ile Gly
    2015                2020                2025

Val Phe  Asn Thr Ser Asp Gly  Phe Lys Tyr Phe Ala  His His Asn
    2030                2035                2040

Glu Asp  Leu Gly Asn Glu Glu  Gly Glu Ala Ile Ser  Tyr Ser Gly
    2045                2050                2055

Ile Leu  Asn Phe Asn Asn Lys  Ile Tyr Tyr Phe Asp  Tyr Ser Phe
    2060                2065                2070

Thr Ala  Val Val Gly Trp Lys  Asp Leu Glu Asp Gly  Ser Lys Tyr
    2075                2080                2085
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Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Val Gly Leu Ser Leu
2090 2095 2100

Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln
2105 2110 2115

Val Gly Phe Val Thr Ile Asn Asn Lys Val Phe Tyr Phe Ser Asp
2120 2125 2130

Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
2135 2140 2145

Phe Tyr Ile Asp Glu Lys Gly Ile Val Gln Ile Gly Val Phe Asp
2150 2155 2160

Thr Ser Asp Glu Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn
2165 2170 2175

Asp Asn Ile Tyr Gly Gln Ala Val Asp Tyr Ser Gly Leu Val Arg
2180 2185 2190

Val Gly Glu Asp Ile Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu
2195 2200 2205

Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile
2225 2230 2235

Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Asn Gly Ile Met Arg Thr
2240 2245 2250

Gly Leu Ile Ser Phe Glu Asn Asn Asp Tyr Tyr Phe Asn Glu Asn
2255 2260 2265

Gly Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe
2270 2275 2280

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Tyr Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr
2285 2290 2295

Gln Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu
2300 2305 2310

Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu
2315 2320 2325

Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr
2330 2335 2340

Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp
2345 2350 2355

Thr Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 164
<211> 2366
<212> PRT
<213> Clostridium difficile

<400> 164

Met Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg
1 5 10 15

Phe Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
20 25 30

Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
35 40 45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
50 55 60

Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65 70 75 80

Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys

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85 90 95

Asn Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
100 105 110

Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
115 120 125

Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
130 135 140

Ile Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145 150 155 160

Leu Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met
165 170 175

Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala
180 185 190

Gln Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile
195 200 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr
210 215 220

Ile Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val
225 230 235 240

Arg Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu
245 250 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu
260 265 270

Arg Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp
275 280 285

Met Leu Pro Gly Ile Gln Pro Gly Leu Phe Glu Ser Ile Glu Lys Pro

290 295 300

Ser Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile
305 310 315 320

Met Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp
325 330 335

Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser
340 345 350

Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala
355 360 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn
370 375 380

Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val
385 390 395 400

Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro
405 410 415

Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile
420 425 430

Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met
435 440 445

Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr
450 455 460

Thr Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp
465 470 475 480

Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala
485 490 495

Asp Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr

```
            500                 505                 510

Glu Gln Glu Met Ala Ser Leu Trp Thr Phe Asp Asp Ala Arg Ala Lys
        515                 520                 525

Val Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly
    530                 535                 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu
545                 550                 555                 560

Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly
                565                 570                 575

Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
            580                 585                 590

Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Ile Leu Phe
        595                 600                 605

Gln Lys Asn Ile Glu Asn Ser Glu Val Ala Tyr Tyr Tyr Asn Pro Gly
    610                 615                 620

Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Arg Ile Pro Ser Ile Ile
625                 630                 635                 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp
                645                 650                 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser
            660                 665                 670

Thr Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Ser
        675                 680                 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser
    690                 695                 700

Ile Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys
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705 710 715 720

Asp Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
725 730 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Asn Glu Gly Arg Arg
740 745 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
755 760 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
770 775 780

Asn Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785 790 795 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Leu Ser Asp Ile Glu Leu Glu
805 810 815

Glu Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
820 825 830

Asp Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr
835 840 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser
850 855 860

Ile Ser Asp Ser Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Asp Asp
865 870 875 880

Ser His Phe Ile Ser Phe Glu Asp Ile Ser Lys Thr Glu Asp Gly Phe
885 890 895

Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
900 905 910

Thr Glu Lys Glu Ile Phe Ser Glu Tyr Ala Asn His Ile Arg Gly Glu

915 920 925

Ile Ser Asn Ile Lys Asp Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
930 935 940

Val Lys Lys Val Asn Leu Asp Ala Ile His Glu Val Asn Thr Leu Asn
945 950 955 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Gly Tyr Ser Ser Ser Lys Glu
965 970 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
980 985 990

Leu Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp Ala Ala Lys Val Val
995 1000 1005

Glu Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu Pro
1010 1015 1020

Thr Leu Ser Glu Gly Leu Pro Val Ile Ala Thr Ile Ile Asp Gly
1025 1030 1035

Val Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp
1040 1045 1050

Pro Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala
1055 1060 1065

Val Asn Leu Thr Ala Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu
1070 1075 1080

Gly Val Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly
1085 1090 1095

Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu
1100 1105 1110

Arg Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Ile Ser

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1115 1120 1125

Leu Val Glu Thr Glu Gly Ala Phe Thr Leu Leu Asp Asp Lys Ile
1130 1135 1140

Met Ile Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn
1145 1150 1155

Asn Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu
1160 1165 1170

Gly Gly Ser Gly His Thr Val Thr Asn Asp Ile Asp His Phe Phe
1175 1180 1185

Ser Ser Pro Thr Ile Thr Tyr Ile Lys Pro His Leu Ser Ile Tyr
1190 1195 1200

Asp Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp
1205 1210 1215

Leu Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu
1220 1225 1230

Thr Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Glu Gly Thr
1235 1240 1245

Lys Leu Leu Asp Arg Ile Arg Asp His Tyr Lys Gly Glu Phe Tyr
1250 1255 1260

Trp Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu
1265 1270 1275

Lys Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser
1280 1285 1290

Asn Asn Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu His Ile
1295 1300 1305

Arg Glu Lys Leu Ser Tyr Ser Phe His Gly Ser Gly Gly Thr Tyr

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1310 1315 1320

Ala Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu
1325 1330 1335

Ser Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg
1340 1345 1350

Asp Val Thr Ile Asp Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile
1355 1360 1365

Glu Gly Ile Leu Ser Thr Leu Ser Ile Glu Asp Asn Lys Ile Ile
1370 1375 1380

Leu Asn His His Glu Ile Asn Phe Ser Gly Asp Val Asn Gly Ser
1385 1390 1395

Asn Gly Phe Ile Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn
1400 1405 1410

Ala Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu
1415 1420 1425

Ile Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile
1430 1435 1440

Gln Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys
1445 1450 1455

Asn Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly
1460 1465 1470

Phe Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu
1475 1480 1485

Pro Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys
1490 1495 1500

Pro Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val

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1505 1510 1515

Ile Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys
1520 1525 1530

Asp Asp Ile Lys Ile Ser Leu Ser Phe Thr Leu Gln Asp Glu Lys
1535 1540 1545

Thr Ile Lys Leu Asn Gly Val His Leu Asp Glu Ser Gly Val Ala
1550 1555 1560

Glu Ile Leu Lys Phe Met Asn Lys Lys Gly Ser Thr Asn Thr Ser
1565 1570 1575

Asp Ser Leu Met Ser Phe Leu Glu Ser Val Asn Ile Lys Ser Ile
1580 1585 1590

Phe Val Asn Phe Leu Gln Ser Lys Ile Asn Phe Ile Leu Asp Ala
1595 1600 1605

Asn Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe
1610 1615 1620

Ile Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe
1625 1630 1635

Asn Thr Leu Glu Thr Thr Tyr Thr Leu Tyr Val Gly Asn Arg Gln
1640 1645 1650

Asn Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp
1655 1660 1665

Ile Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly
1670 1675 1680

Ile Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr
1685 1690 1695

Thr Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Asn

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1700 1705 1710

Tyr Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys
1715 1720 1725

Ile Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser
1730 1735 1740

Asn Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn
1745 1750 1755

Lys Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp
1760 1765 1770

Lys Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln
1775 1780 1785

Asp Val Pro Val Ser Glu Ile Ile Ser Ala Phe Thr Pro Ser Tyr
1790 1795 1800

Tyr Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu
1805 1810 1815

Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser
1820 1825 1830

Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro
1835 1840 1845

Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys
1850 1855 1860

Tyr Tyr Phe Asn Pro Thr Asn Gly Gly Ala Ala Ser Ile Gly Glu
1865 1870 1875

Thr Ile Ile Asn Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Ile
1880 1885 1890

Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Leu Lys Tyr Phe

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1895 1900 1905

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile
1910 1915 1920

Asp Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe
1925 1930 1935

Glu Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly
1940 1945 1950

Glu Met Tyr Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly
1955 1960 1965

Leu Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly
1970 1975 1980

Ile Met Gln Lys Gly Phe Val Ser Ile Asn Asp Lys Lys Tyr Tyr
1985 1990 1995

Phe Asp Asp Ser Gly Val Met Lys Val Gly Tyr Ile Glu Ile Asp
2000 2005 2010

Gly Lys Tyr Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly
2015 2020 2025

Val Phe Asn Thr Ser Asp Gly Phe Lys Tyr Phe Ala His His Asn
2030 2035 2040

Glu Asp Leu Gly Asn Glu Glu Gly Glu Ala Ile Ser Tyr Ser Gly
2045 2050 2055

Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Tyr Ser Phe
2060 2065 2070

Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr
2075 2080 2085

Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Val Gly Leu Ser Leu

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2090 2095 2100

Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln
2105 2110 2115

Val Gly Phe Val Thr Ile Asn Asn Lys Val Phe Tyr Phe Ser Asp
2120 2125 2130

Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
2135 2140 2145

Phe Tyr Ile Asp Glu Lys Gly Ile Val Gln Ile Gly Val Phe Asp
2150 2155 2160

Thr Ser Asp Glu Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn
2165 2170 2175

Asp Asn Ile Tyr Gly Gln Ala Val Asp Tyr Ser Gly Leu Val Arg
2180 2185 2190

Val Gly Glu Asp Ile Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu
2195 2200 2205

Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile
2225 2230 2235

Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Asn Gly Ile Met Arg Thr
2240 2245 2250

Gly Leu Ile Ser Phe Glu Asn Asn Asp Tyr Tyr Phe Asn Glu Asn
2255 2260 2265

Gly Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe
2270 2275 2280

Tyr Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr

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2285 2290 2295

Gln Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu
2300 2305 2310

Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu
2315 2320 2325

Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr
2330 2335 2340

Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp
2345 2350 2355

Thr Ala Gln Leu Val Ile Ser Glu
2360 2365

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<213> Clostridium difficile

<400> 165

Met Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg
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Phe Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
20 25 30

Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
35 40 45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
50 55 60

Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65 70 75 80

Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys
85 90 95

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Asn Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
            100                 105                 110

Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
        115                 120                 125

Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
    130                 135                 140

Ile Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145                 150                 155                 160

Leu Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met
                165                 170                 175

Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala
            180                 185                 190

Gln Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile
        195                 200                 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr
    210                 215                 220

Ile Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val
225                 230                 235                 240

Arg Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu
                245                 250                 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu
            260                 265                 270

Arg Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp
        275                 280                 285

Met Leu Pro Gly Ile Gln Pro Gly Leu Phe Glu Ser Ile Glu Lys Pro
    290                 295                 300
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Ser Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile
305                 310                 315                 320

Met Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp
                325                 330                 335

Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser
            340                 345                 350

Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala
        355                 360                 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn
    370                 375                 380

Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val
385                 390                 395                 400

Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro
                405                 410                 415

Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile
            420                 425                 430

Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met
        435                 440                 445

Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr
    450                 455                 460

Thr Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp
465                 470                 475                 480

Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala
                485                 490                 495

Asp Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr
            500                 505                 510
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```
Glu Gln Glu Met Ala Ser Leu Trp Thr Phe Asp Asp Ala Arg Ala Lys
        515                 520                 525

Val Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly
    530                 535                 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu
545                 550                 555                 560

Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly
                565                 570                 575

Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
            580                 585                 590

Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Ile Leu Phe
        595                 600                 605

Gln Lys Asn Ile Glu Asn Ser Glu Val Ala Tyr Tyr Tyr Asn Pro Gly
    610                 615                 620

Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Arg Ile Pro Ser Ile Ile
625                 630                 635                 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp
                645                 650                 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser
            660                 665                 670

Thr Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Ser
        675                 680                 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser
    690                 695                 700

Ile Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys
705                 710                 715                 720
```

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```
Asp Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
                725                 730                 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Asn Glu Gly Arg Arg
            740                 745                 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
        755                 760                 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
    770                 775                 780

Asn Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785                 790                 795                 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Leu Ser Asp Ile Glu Leu Glu
                805                 810                 815

Glu Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
            820                 825                 830

Asp Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr
        835                 840                 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser
    850                 855                 860

Ile Ser Asp Ser Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Asp Asp
865                 870                 875                 880

Ser His Phe Ile Ser Phe Glu Asp Ile Ser Lys Thr Glu Asp Gly Phe
                885                 890                 895

Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
            900                 905                 910

Thr Glu Lys Glu Ile Phe Ser Glu Tyr Ala Asn His Ile Arg Gly Glu
        915                 920                 925
```

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```
Ile Ser Asn Ile Lys Asp Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
    930                 935                 940

Val Lys Lys Val Asn Leu Asp Ala Ile His Glu Val Asn Thr Leu Asn
945                 950                 955                 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Gly Tyr Ser Ser Ser Lys Glu
                965                 970                 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
            980                 985                 990

Leu Phe Ser Thr Gly Leu Asn Thr  Ile Thr Asp Ala Ala  Lys Val Val
        995                 1000                1005

Glu Leu  Val Ser Thr Ala Leu  Asp Glu Thr Ile Asp  Leu Leu Pro
    1010                1015                1020

Thr Leu  Ser Glu Gly Leu Pro  Val Ile Ala Thr Ile  Ile Asp Gly
    1025                1030                1035

Val Ser  Leu Gly Ala Ala Ile  Lys Glu Leu Ser Glu  Thr Ser Asp
    1040                1045                1050

Pro Leu  Leu Arg Gln Glu Ile  Glu Ala Lys Ile Gly  Ile Met Ala
    1055                1060                1065

Val Asn  Leu Thr Ala Ala Thr  Thr Ala Ile Ile Thr  Ser Ser Leu
    1070                1075                1080

Gly Val  Ala Ser Gly Phe Ser  Ile Leu Leu Val Pro  Leu Ala Gly
    1085                1090                1095

Ile Ser  Ala Gly Ile Pro Ser  Leu Val Asn Asn Glu  Leu Val Leu
    1100                1105                1110

Arg Asp  Lys Ala Thr Lys Val  Val Asp Tyr Phe Lys  His Ile Ser
    1115                1120                1125
```

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```
Leu Val  Glu Thr Glu Gly Ala  Phe Thr Leu Leu Asp  Asp Lys Ile
    1130                1135                1140

Met Ile  Pro Gln Asp Asp Leu  Val Ile Ser Glu Ile  Asp Phe Asn
    1145                1150                1155

Asn Asn  Ser Ile Val Leu Gly  Lys Cys Glu Ile Trp  Arg Met Glu
    1160                1165                1170

Gly Gly  Ser Gly His Thr Val  Thr Asn Asp Ile Asp  His Phe Phe
    1175                1180                1185

Ser Ser  Pro Thr Ile Thr Tyr  Ile Lys Pro His Leu  Ser Ile Tyr
    1190                1195                1200

Asp Val  Leu Glu Val Gln Lys  Glu Glu Leu Asp Leu  Ser Lys Asp
    1205                1210                1215

Leu Met  Val Leu Pro Asn Ala  Pro Asn Arg Val Phe  Ala Trp Glu
    1220                1225                1230

Thr Gly  Trp Thr Pro Gly Leu  Arg Ser Leu Glu Asn  Glu Gly Thr
    1235                1240                1245

Lys Leu  Leu Asp Arg Ile Arg  Asp His Tyr Lys Gly  Glu Phe Tyr
    1250                1255                1260

Trp Arg  Tyr Phe Ala Phe Ile  Ala Asp Ala Leu Ile  Thr Thr Leu
    1265                1270                1275

Lys Pro  Arg Tyr Glu Asp Thr  Asn Ile Arg Ile Asn  Leu Asp Ser
    1280                1285                1290

Asn Asn  Arg Ser Phe Ile Val  Pro Ile Ile Thr Thr  Glu His Ile
    1295                1300                1305

Arg Glu  Lys Leu Ser Tyr Ser  Phe His Gly Ser Gly  Gly Thr Tyr
    1310                1315                1320
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Ala Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu
1325 1330 1335

Ser Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg
1340 1345 1350

Asp Val Thr Ile Asp Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile
1355 1360 1365

Glu Gly Ile Leu Ser Thr Leu Ser Ile Glu Asp Asn Lys Ile Ile
1370 1375 1380

Leu Asn His His Glu Ile Asn Phe Ser Gly Asp Val Asn Gly Ser
1385 1390 1395

Asn Gly Phe Ile Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn
1400 1405 1410

Ala Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu
1415 1420 1425

Ile Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile
1430 1435 1440

Gln Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys
1445 1450 1455

Asn Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly
1460 1465 1470

Phe Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu
1475 1480 1485

Pro Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys
1490 1495 1500

Pro Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val
1505 1510 1515

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Ile Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys
1520 1525 1530

Asp Asp Ile Lys Ile Ser Leu Ser Phe Thr Leu Gln Asp Glu Lys
1535 1540 1545

Thr Ile Lys Leu Asn Gly Val His Leu Asp Glu Ser Gly Val Ala
1550 1555 1560

Glu Ile Leu Lys Phe Met Asn Lys Lys Gly Ser Thr Asn Thr Ser
1565 1570 1575

Asp Ser Leu Met Ser Phe Leu Glu Ser Val Asn Ile Lys Ser Ile
1580 1585 1590

Phe Val Asn Phe Leu Gln Ser Lys Ile Asn Phe Ile Leu Asp Ala
1595 1600 1605

Asn Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe
1610 1615 1620

Ile Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe
1625 1630 1635

Asn Thr Leu Glu Thr Thr Tyr Thr Leu Tyr Val Gly Asn Arg Gln
1640 1645 1650

Asn Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp
1655 1660 1665

Ile Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly
1670 1675 1680

Ile Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr
1685 1690 1695

Thr Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Asn
1700 1705 1710

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Tyr Pro  Glu Val Ile Val Leu  Asp Ala Asn Tyr Ile  Asn Glu Lys
    1715                1720                1725

Ile Asn  Val Asn Ile Asn Asp  Leu Ser Ile Arg Tyr  Val Trp Ser
    1730                1735                1740

Asn Asp  Gly Asn Asp Phe Ile  Leu Met Ser Thr Ser  Glu Glu Asn
    1745                1750                1755

Lys Val  Ser Gln Val Lys Ile  Arg Phe Val Asn Val  Phe Lys Asp
    1760                1765                1770

Lys Thr  Leu Ala Asn Lys Leu  Ser Phe Asn Phe Ser  Asp Lys Gln
    1775                1780                1785

Asp Val  Pro Val Ser Glu Ile  Ile Ser Ala Phe Thr  Pro Ser Tyr
    1790                1795                1800

Tyr Glu  Asp Gly Leu Ile Gly  Tyr Asp Leu Gly Leu  Val Ser Leu
    1805                1810                1815

Tyr Asn  Glu Lys Phe Tyr Ile  Asn Asn Phe Gly Met  Met Val Ser
    1820                1825                1830

Gly Leu  Ile Tyr Ile Asn Asp  Ser Leu Tyr Tyr Phe  Lys Pro Pro
    1835                1840                1845

Val Asn  Asn Leu Ile Thr Gly  Phe Val Thr Val Gly  Asp Asp Lys
    1850                1855                1860

Tyr Tyr  Phe Asn Pro Thr Asn  Gly Gly Ala Ala Ser  Ile Gly Glu
    1865                1870                1875

Thr Ile  Ile Asn Asp Lys Asn  Tyr Tyr Phe Asn Gln  Ser Gly Ile
    1880                1885                1890

Leu Gln  Thr Gly Val Phe Ser  Thr Glu Asp Gly Leu  Lys Tyr Phe
    1895                1900                1905
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```
Ala Pro  Ala Asn Thr Leu Asp  Glu Asn Leu Glu Gly  Glu Ala Ile
    1910                1915                1920

Asp Phe  Thr Gly Lys Leu Ile  Ile Asp Glu Asn Ile  Tyr Tyr Phe
    1925                1930                1935

Glu Asp  Asn Tyr Arg Gly Ala  Val Glu Trp Lys Glu  Leu Asp Gly
    1940                1945                1950

Glu Met  Tyr Tyr Phe Ser Pro  Glu Thr Gly Lys Ala  Phe Lys Gly
    1955                1960                1965

Leu Asn  Gln Ile Gly Asp Asp  Lys Tyr Tyr Phe Asn  Ser Asp Gly
    1970                1975                1980

Ile Met  Gln Lys Gly Phe Val  Ser Ile Asn Asp Lys  Lys Tyr Tyr
    1985                1990                1995

Phe Asp  Asp Ser Gly Val Met  Lys Val Gly Tyr Ile  Glu Ile Asp
    2000                2005                2010

Gly Lys  Tyr Phe Tyr Phe Ala  Glu Asn Gly Glu Met  Gln Ile Gly
    2015                2020                2025

Val Phe  Asn Thr Ser Asp Gly  Phe Lys Tyr Phe Ala  His His Asn
    2030                2035                2040

Glu Asp  Leu Gly Asn Glu Glu  Gly Glu Ala Ile Ser  Tyr Ser Gly
    2045                2050                2055

Ile Leu  Asn Phe Asn Asn Lys  Ile Tyr Tyr Phe Asp  Tyr Ser Phe
    2060                2065                2070

Thr Ala  Val Val Gly Trp Lys  Asp Leu Glu Asp Gly  Ser Lys Tyr
    2075                2080                2085

Tyr Phe  Asp Glu Asp Thr Ala  Glu Ala Tyr Val Gly  Leu Ser Leu
    2090                2095                2100
```

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```
Ile Asn  Asp Gly Gln Tyr Tyr  Phe Asn Asp Asp Gly  Ile Met Gln
    2105                 2110                 2115

Val Gly  Phe Val Thr Ile Asn  Asn Lys Val Phe Tyr  Phe Ser Asp
    2120                 2125                 2130

Ser Gly  Ile Ile Glu Ser Gly  Val Gln Asn Ile Asp  Asp Asn Tyr
    2135                 2140                 2145

Phe Tyr  Ile Asp Glu Lys Gly  Ile Val Gln Ile Gly  Val Phe Asp
    2150                 2155                 2160

Thr Ser  Asp Glu Tyr Lys Tyr  Phe Ala Pro Ala Asn  Thr Val Asn
    2165                 2170                 2175

Asp Asn  Ile Tyr Gly Gln Ala  Val Asp Tyr Ser Gly  Leu Val Arg
    2180                 2185                 2190

Val Gly  Glu Asp Ile Tyr Tyr  Phe Gly Glu Thr Tyr  Thr Ile Glu
    2195                 2200                 2205

Thr Gly  Trp Ile Tyr Asp Met  Glu Asn Glu Ser Asp  Lys Tyr Tyr
    2210                 2215                 2220

Phe Asn  Pro Glu Thr Lys Lys  Ala Cys Lys Gly Ile  Asn Leu Ile
    2225                 2230                 2235

Asp Asp  Ile Lys Tyr Tyr Phe  Asp Glu Asn Gly Ile  Met Arg Thr
    2240                 2245                 2250

Gly Leu  Ile Ser Phe Glu Asn  Asn Asp Tyr Tyr Phe  Asn Glu Asn
    2255                 2260                 2265

Gly Glu  Met Gln Phe Gly Tyr  Ile Asn Ile Glu Asp  Lys Met Phe
    2270                 2275                 2280

Tyr Phe  Gly Glu Asp Gly Val  Met Gln Ile Gly Val  Phe Asn Thr
    2285                 2290                 2295
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Gln Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu
2300 2305 2310

Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu
2315 2320 2325

Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr
2330 2335 2340

Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp
2345 2350 2355

Thr Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 166
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<400> 166

Met Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg
1 5 10 15

Phe Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
20 25 30

Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
35 40 45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
50 55 60

Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65 70 75 80

Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys
85 90 95

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```
Asn Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
            100                 105                 110

Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
        115                 120                 125

Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
    130                 135                 140

Ile Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145                 150                 155                 160

Leu Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met
                165                 170                 175

Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala
            180                 185                 190

Gln Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile
        195                 200                 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr
    210                 215                 220

Ile Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val
225                 230                 235                 240

Arg Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu
                245                 250                 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu
            260                 265                 270

Arg Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp
        275                 280                 285

Met Leu Pro Gly Ile Gln Pro Gly Leu Phe Glu Ser Ile Glu Lys Pro
    290                 295                 300
```

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```
Ser Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile
305                 310                 315                 320

Met Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp
                325                 330                 335

Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser
            340                 345                 350

Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala
        355                 360                 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn
    370                 375                 380

Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val
385                 390                 395                 400

Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro
                405                 410                 415

Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile
            420                 425                 430

Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met
        435                 440                 445

Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr
    450                 455                 460

Thr Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp
465                 470                 475                 480

Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala
                485                 490                 495

Asp Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr
            500                 505                 510
```

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```
Glu Gln Glu Met Ala Ser Leu Trp Thr Phe Asp Asp Ala Arg Ala Lys
        515                 520                 525

Val Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly
    530                 535                 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu
545                 550                 555                 560

Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly
                565                 570                 575

Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
            580                 585                 590

Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Ile Leu Phe
        595                 600                 605

Gln Lys Asn Ile Glu Asn Ser Glu Val Ala Tyr Tyr Tyr Asn Pro Gly
    610                 615                 620

Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Arg Ile Pro Ser Ile Ile
625                 630                 635                 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp
                645                 650                 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser
            660                 665                 670

Thr Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Ser
        675                 680                 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser
    690                 695                 700

Ile Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys
705                 710                 715                 720
```

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```
Asp Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
                725                 730                 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Asn Glu Gly Arg Arg
            740                 745                 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
        755                 760                 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
    770                 775                 780

Asn Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785                 790                 795                 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Leu Ser Asp Ile Glu Leu Glu
                805                 810                 815

Glu Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
            820                 825                 830

Asp Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr
        835                 840                 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser
    850                 855                 860

Ile Ser Asp Ser Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Asp Asp
865                 870                 875                 880

Ser His Phe Ile Ser Phe Glu Asp Ile Ser Lys Thr Glu Asp Gly Phe
                885                 890                 895

Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
            900                 905                 910

Thr Glu Lys Glu Ile Phe Ser Glu Tyr Ala Asn His Ile Arg Gly Glu
        915                 920                 925
```

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```
Ile Ser Asn Ile Lys Asp Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
    930                 935                 940

Val Lys Lys Val Asn Leu Asp Ala Ile His Glu Val Asn Thr Leu Asn
945                 950                 955                 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Gly Tyr Ser Ser Ser Lys Glu
                965                 970                 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
            980                 985                 990

Leu Phe Ser Thr Gly Leu Asn Thr  Ile Thr Asp Ala Ala  Lys Val Val
        995                 1000                1005

Glu Leu  Val Ser Thr Ala Leu  Asp Glu Thr Ile Asp  Leu Leu Pro
    1010                1015                1020

Thr Leu  Ser Glu Gly Leu Pro  Val Ile Ala Thr Ile  Ile Asp Gly
    1025                1030                1035

Val Ser  Leu Gly Ala Ala Ile  Lys Glu Leu Ser Glu  Thr Ser Asp
    1040                1045                1050

Pro Leu  Leu Arg Gln Glu Ile  Glu Ala Lys Ile Gly  Ile Met Ala
    1055                1060                1065

Val Asn  Leu Thr Ala Ala Thr  Thr Ala Ile Ile Thr  Ser Ser Leu
    1070                1075                1080

Gly Val  Ala Ser Gly Phe Ser  Ile Leu Leu Val Pro  Leu Ala Gly
    1085                1090                1095

Ile Ser  Ala Gly Ile Pro Ser  Leu Val Asn Asn Glu  Leu Val Leu
    1100                1105                1110

Arg Asp  Lys Ala Thr Lys Val  Val Asp Tyr Phe Lys  His Ile Ser
    1115                1120                1125
```

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```
Leu Val  Glu Thr Glu Gly Ala  Phe Thr Leu Leu Asp  Asp Lys Ile
    1130                1135                1140

Met Ile  Pro Gln Asp Asp Leu  Val Ile Ser Glu Ile  Asp Phe Asn
    1145                1150                1155

Asn Asn  Ser Ile Val Leu Gly  Lys Cys Glu Ile Trp  Arg Met Glu
    1160                1165                1170

Gly Gly  Ser Gly His Thr Val  Thr Asn Asp Ile Asp  His Phe Phe
    1175                1180                1185

Ser Ser  Pro Thr Ile Thr Tyr  Ile Lys Pro His Leu  Ser Ile Tyr
    1190                1195                1200

Asp Val  Leu Glu Val Gln Lys  Glu Glu Leu Asp Leu  Ser Lys Asp
    1205                1210                1215

Leu Met  Val Leu Pro Asn Ala  Pro Asn Arg Val Phe  Ala Trp Glu
    1220                1225                1230

Thr Gly  Trp Thr Pro Gly Leu  Arg Ser Leu Glu Asn  Glu Gly Thr
    1235                1240                1245

Lys Leu  Leu Asp Arg Ile Arg  Asp His Tyr Lys Gly  Glu Phe Tyr
    1250                1255                1260

Trp Arg  Tyr Phe Ala Phe Ile  Ala Asp Ala Leu Ile  Thr Thr Leu
    1265                1270                1275

Lys Pro  Arg Tyr Glu Asp Thr  Asn Ile Arg Ile Asn  Leu Asp Ser
    1280                1285                1290

Asn Asn  Arg Ser Phe Ile Val  Pro Ile Ile Thr Thr  Glu His Ile
    1295                1300                1305

Arg Glu  Lys Leu Ser Tyr Ser  Phe His Gly Ser Gly  Gly Thr Tyr
    1310                1315                1320
```

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```
Ala Leu  Ser Leu Ser Gln Tyr  Asn Met Gly Ile Asn  Ile Glu Leu
    1325                1330                1335

Ser Glu  Ser Asp Val Trp Ile  Ile Asp Val Asp Asn  Val Val Arg
    1340                1345                1350

Asp Val  Thr Ile Asp Ser Asp  Lys Ile Lys Lys Gly  Asp Leu Ile
    1355                1360                1365

Glu Gly  Ile Leu Ser Thr Leu  Ser Ile Glu Asp Asn  Lys Ile Ile
    1370                1375                1380

Leu Asn  His His Glu Ile Asn  Phe Ser Gly Asp Val  Asn Gly Ser
    1385                1390                1395

Asn Gly  Phe Ile Ser Leu Thr  Phe Ser Ile Leu Glu  Gly Ile Asn
    1400                1405                1410

Ala Ile  Ile Glu Val Asp Leu  Leu Ser Lys Ser Tyr  Lys Leu Leu
    1415                1420                1425

Ile Ser  Gly Glu Leu Lys Ile  Leu Met Leu Asn Ser  Asn His Ile
    1430                1435                1440

Gln Gln  Lys Ile Asp Tyr Ile  Gly Phe Asn Ser Glu  Leu Gln Lys
    1445                1450                1455

Asn Ile  Pro Tyr Ser Phe Val  Asp Ser Glu Gly Lys  Glu Asn Gly
    1460                1465                1470

Phe Ile  Asn Gly Ser Thr Lys  Glu Gly Leu Phe Val  Ser Glu Leu
    1475                1480                1485

Pro Asp  Val Val Leu Ile Ser  Lys Val Tyr Met Asp  Asp Ser Lys
    1490                1495                1500

Pro Ser  Phe Gly Tyr Tyr Ser  Asn Asn Leu Lys Asp  Val Lys Val
    1505                1510                1515
```

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```
Ile Thr  Lys Asp Asn Val Asn  Ile Leu Thr Gly Tyr  Tyr Leu Lys
    1520                1525                1530

Asp Asp  Ile Lys Ile Ser Leu  Ser Phe Thr Leu Gln  Asp Glu Lys
    1535                1540                1545

Thr Ile  Lys Leu Asn Gly Val  His Leu Asp Glu Ser  Gly Val Ala
    1550                1555                1560

Glu Ile  Leu Lys Phe Met Asn  Lys Lys Gly Ser Thr  Asn Thr Ser
    1565                1570                1575

Asp Ser  Leu Met Ser Phe Leu  Glu Ser Val Asn Ile  Lys Ser Ile
    1580                1585                1590

Phe Val  Asn Phe Leu Gln Ser  Lys Ile Asn Phe Ile  Leu Asp Ala
    1595                1600                1605

Asn Phe  Ile Ile Ser Gly Thr  Thr Ser Ile Gly Gln  Phe Glu Phe
    1610                1615                1620

Ile Cys  Asp Glu Asn Asp Asn  Ile Gln Pro Tyr Phe  Ile Lys Phe
    1625                1630                1635

Asn Thr  Leu Glu Thr Thr Tyr  Thr Leu Tyr Val Gly  Asn Arg Gln
    1640                1645                1650

Asn Met  Ile Val Glu Pro Asn  Tyr Asp Leu Asp Asp  Ser Gly Asp
    1655                1660                1665

Ile Ser  Ser Thr Val Ile Asn  Phe Ser Gln Lys Tyr  Leu Tyr Gly
    1670                1675                1680

Ile Asp  Ser Cys Val Asn Lys  Val Val Ile Ser Pro  Asn Ile Tyr
    1685                1690                1695

Thr Asp  Glu Ile Asn Ile Thr  Pro Val Tyr Glu Thr  Asn Asn Asn
    1700                1705                1710
```

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Tyr Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys
1715 1720 1725

Ile Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser
1730 1735 1740

Asn Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn
1745 1750 1755

Lys Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp
1760 1765 1770

Lys Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln
1775 1780 1785

Asp Val Pro Val Ser Glu Ile Ile Ser Ala Phe Thr Pro Ser Tyr
1790 1795 1800

Tyr Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu
1805 1810 1815

Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser
1820 1825 1830

Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro
1835 1840 1845

Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys
1850 1855 1860

Tyr Tyr Phe Asn Pro Thr Asn Gly Gly Ala Ala Ser Ile Gly Glu
1865 1870 1875

Thr Ile Ile Asn Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Ile
1880 1885 1890

Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Leu Lys Tyr Phe
1895 1900 1905

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Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile
1910 1915 1920

Asp Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe
1925 1930 1935

Glu Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly
1940 1945 1950

Glu Met Tyr Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly
1955 1960 1965

Leu Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly
1970 1975 1980

Ile Met Gln Lys Gly Phe Val Ser Ile Asn Asp Lys Lys Tyr Tyr
1985 1990 1995

Phe Asp Asp Ser Gly Val Met Lys Val Gly Tyr Ile Glu Ile Asp
2000 2005 2010

Gly Lys Tyr Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly
2015 2020 2025

Val Phe Asn Thr Ser Asp Gly Phe Lys Tyr Phe Ala His His Asn
2030 2035 2040

Glu Asp Leu Gly Asn Glu Glu Gly Glu Ala Ile Ser Tyr Ser Gly
2045 2050 2055

Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Tyr Ser Phe
2060 2065 2070

Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr
2075 2080 2085

Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Val Gly Leu Ser Leu
2090 2095 2100

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```
Ile Asn  Asp Gly Gln Tyr Tyr  Phe Asn Asp Asp Gly  Ile Met Gln
    2105                 2110                 2115

Val Gly  Phe Val Thr Ile Asn  Asn Lys Val Phe Tyr  Phe Ser Asp
    2120                 2125                 2130

Ser Gly  Ile Ile Glu Ser Gly  Val Gln Asn Ile Asp  Asp Asn Tyr
    2135                 2140                 2145

Phe Tyr  Ile Asp Glu Lys Gly  Ile Val Gln Ile Gly  Val Phe Asp
    2150                 2155                 2160

Thr Ser  Asp Glu Tyr Lys Tyr  Phe Ala Pro Ala Asn  Thr Val Asn
    2165                 2170                 2175

Asp Asn  Ile Tyr Gly Gln Ala  Val Asp Tyr Ser Gly  Leu Val Arg
    2180                 2185                 2190

Val Gly  Glu Asp Ile Tyr Tyr  Phe Gly Glu Thr Tyr  Thr Ile Glu
    2195                 2200                 2205

Thr Gly  Trp Ile Tyr Asp Met  Glu Asn Glu Ser Asp  Lys Tyr Tyr
    2210                 2215                 2220

Phe Asn  Pro Glu Thr Lys Lys  Ala Cys Lys Gly Ile  Asn Leu Ile
    2225                 2230                 2235

Asp Asp  Ile Lys Tyr Tyr Phe  Asp Glu Asn Gly Ile  Met Arg Thr
    2240                 2245                 2250

Gly Leu  Ile Ser Phe Glu Asn  Asn Asp Tyr Tyr Phe  Asn Glu Asn
    2255                 2260                 2265

Gly Glu  Met Gln Phe Gly Tyr  Ile Asn Ile Glu Asp  Lys Met Phe
    2270                 2275                 2280

Tyr Phe  Gly Glu Asp Gly Val  Met Gln Ile Gly Val  Phe Asn Thr
    2285                 2290                 2295
```

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Gln Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu
2300 2305 2310

Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu
2315 2320 2325

Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr
2330 2335 2340

Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp
2345 2350 2355

Thr Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 167
<211> 2366
<212> PRT
<213> Clostridium difficile

<400> 167

Met Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg
1 5 10 15

Phe Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
20 25 30

Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
35 40 45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
50 55 60

Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65 70 75 80

Ile Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys
85 90 95

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```
Asn Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
            100                 105                 110

Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
        115                 120                 125

Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
    130                 135                 140

Ile Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145                 150                 155                 160

Leu Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met
                165                 170                 175

Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala
            180                 185                 190

Gln Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile
        195                 200                 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr
    210                 215                 220

Ile Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val
225                 230                 235                 240

Arg Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu
                245                 250                 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu
            260                 265                 270

Arg Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp
        275                 280                 285

Met Leu Pro Gly Ile Gln Pro Gly Leu Phe Glu Ser Ile Glu Lys Pro
    290                 295                 300
```

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```
Ser Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile
305                 310                 315                 320

Met Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp
                325                 330                 335

Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser
            340                 345                 350

Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala
        355                 360                 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn
    370                 375                 380

Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val
385                 390                 395                 400

Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro
                405                 410                 415

Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile
            420                 425                 430

Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met
        435                 440                 445

Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr
    450                 455                 460

Thr Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp
465                 470                 475                 480

Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala
                485                 490                 495

Asp Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr
            500                 505                 510
```

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```
Glu Gln Glu Met Ala Ser Leu Trp Thr Phe Asp Asp Ala Arg Ala Lys
        515                 520                 525

Val Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly
    530                 535                 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu
545                 550                 555                 560

Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly
                565                 570                 575

Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
            580                 585                 590

Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Ile Leu Phe
        595                 600                 605

Gln Lys Asn Ile Glu Asn Ser Glu Val Ala Tyr Tyr Tyr Asn Pro Gly
    610                 615                 620

Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Arg Ile Pro Ser Ile Ile
625                 630                 635                 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp
                645                 650                 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser
            660                 665                 670

Thr Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Ser
        675                 680                 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser
    690                 695                 700

Ile Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys
705                 710                 715                 720
```

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```
Asp Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
                725                 730                 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Asn Glu Gly Arg Arg
            740                 745                 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
        755                 760                 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
    770                 775                 780

Asn Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785                 790                 795                 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Leu Ser Asp Ile Glu Leu Glu
                805                 810                 815

Glu Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
            820                 825                 830

Asp Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr
        835                 840                 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser
    850                 855                 860

Ile Ser Asp Ser Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Asp Asp
865                 870                 875                 880

Ser His Phe Ile Ser Phe Glu Asp Ile Ser Lys Thr Glu Asp Gly Phe
                885                 890                 895

Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
            900                 905                 910

Thr Glu Lys Glu Ile Phe Ser Glu Tyr Ala Asn His Ile Arg Gly Glu
        915                 920                 925
```

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```
Ile Ser Asn Ile Lys Asp Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
    930                 935                 940

Val Lys Lys Val Asn Leu Asp Ala Ile His Glu Val Asn Thr Leu Asn
945                 950                 955                 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Gly Tyr Ser Ser Ser Lys Glu
                965                 970                 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
            980                 985                 990

Leu Phe Ser Thr Gly Leu Asn Thr  Ile Thr Asp Ala Ala  Lys Val Val
        995                 1000                1005

Glu Leu  Val Ser Thr Ala Leu  Asp Glu Thr Ile Asp  Leu Leu Pro
    1010                1015                1020

Thr Leu  Ser Glu Gly Leu Pro  Val Ile Ala Thr Ile  Ile Asp Gly
    1025                1030                1035

Val Ser  Leu Gly Ala Ala Ile  Lys Glu Leu Ser Glu  Thr Ser Asp
    1040                1045                1050

Pro Leu  Leu Arg Gln Glu Ile  Glu Ala Lys Ile Gly  Ile Met Ala
    1055                1060                1065

Val Asn  Leu Thr Ala Ala Thr  Thr Ala Ile Ile Thr  Ser Ser Leu
    1070                1075                1080

Gly Val  Ala Ser Gly Phe Ser  Ile Leu Leu Val Pro  Leu Ala Gly
    1085                1090                1095

Ile Ser  Ala Gly Ile Pro Ser  Leu Val Asn Asn Glu  Leu Val Leu
    1100                1105                1110

Arg Asp  Lys Ala Thr Lys Val  Val Asp Tyr Phe Lys  His Ile Ser
    1115                1120                1125
```

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```
Leu Val  Glu Thr Glu Gly Ala  Phe Thr Leu Leu Asp  Asp Lys Ile
    1130                1135                1140

Met Ile  Pro Gln Asp Asp Leu  Val Ile Ser Glu Ile  Asp Phe Asn
    1145                1150                1155

Asn Asn  Ser Ile Val Leu Gly  Lys Cys Glu Ile Trp  Arg Met Glu
    1160                1165                1170

Gly Gly  Ser Gly His Thr Val  Thr Asn Asp Ile Asp  His Phe Phe
    1175                1180                1185

Ser Ser  Pro Thr Ile Thr Tyr  Ile Lys Pro His Leu  Ser Ile Tyr
    1190                1195                1200

Asp Val  Leu Glu Val Gln Lys  Glu Glu Leu Asp Leu  Ser Lys Asp
    1205                1210                1215

Leu Met  Val Leu Pro Asn Ala  Pro Asn Arg Val Phe  Ala Trp Glu
    1220                1225                1230

Thr Gly  Trp Thr Pro Gly Leu  Arg Ser Leu Glu Asn  Glu Gly Thr
    1235                1240                1245

Lys Leu  Leu Asp Arg Ile Arg  Asp His Tyr Lys Gly  Glu Phe Tyr
    1250                1255                1260

Trp Arg  Tyr Phe Ala Phe Ile  Ala Asp Ala Leu Ile  Thr Thr Leu
    1265                1270                1275

Lys Pro  Arg Tyr Glu Asp Thr  Asn Ile Arg Ile Asn  Leu Asp Ser
    1280                1285                1290

Asn Asn  Arg Ser Phe Ile Val  Pro Ile Ile Thr Thr  Glu His Ile
    1295                1300                1305

Arg Glu  Lys Leu Ser Tyr Ser  Phe His Gly Ser Gly  Gly Thr Tyr
    1310                1315                1320
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Ala Leu  Ser Leu Ser Gln Tyr  Asn Met Gly Ile Asn  Ile Glu Leu
    1325                1330                1335

Ser Glu  Ser Asp Val Trp Ile  Ile Asp Val Asp Asn  Val Val Arg
    1340                1345                1350

Asp Val  Thr Ile Asp Ser Asp  Lys Ile Lys Lys Gly  Asp Leu Ile
    1355                1360                1365

Glu Gly  Ile Leu Ser Thr Leu  Ser Ile Glu Asp Asn  Lys Ile Ile
    1370                1375                1380

Leu Asn  His His Glu Ile Asn  Phe Ser Gly Asp Val  Asn Gly Ser
    1385                1390                1395

Asn Gly  Phe Ile Ser Leu Thr  Phe Ser Ile Leu Glu  Gly Ile Asn
    1400                1405                1410

Ala Ile  Ile Glu Val Asp Leu  Leu Ser Lys Ser Tyr  Lys Leu Leu
    1415                1420                1425

Ile Ser  Gly Glu Leu Lys Ile  Leu Met Leu Asn Ser  Asn His Ile
    1430                1435                1440

Gln Gln  Lys Ile Asp Tyr Ile  Gly Phe Asn Ser Glu  Leu Gln Lys
    1445                1450                1455

Asn Ile  Pro Tyr Ser Phe Val  Asp Ser Glu Gly Lys  Glu Asn Gly
    1460                1465                1470

Phe Ile  Asn Gly Ser Thr Lys  Glu Gly Leu Phe Val  Ser Glu Leu
    1475                1480                1485

Pro Asp  Val Val Leu Ile Ser  Lys Val Tyr Met Asp  Asp Ser Lys
    1490                1495                1500

Pro Ser  Phe Gly Tyr Tyr Ser  Asn Asn Leu Lys Asp  Val Lys Val
    1505                1510                1515
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```
Ile Thr  Lys Asp Asn Val Asn  Ile Leu Thr Gly Tyr  Tyr Leu Lys
    1520                1525                1530

Asp Asp  Ile Lys Ile Ser Leu  Ser Phe Thr Leu Gln  Asp Glu Lys
    1535                1540                1545

Thr Ile  Lys Leu Asn Gly Val  His Leu Asp Glu Ser  Gly Val Ala
    1550                1555                1560

Glu Ile  Leu Lys Phe Met Asn  Lys Lys Gly Ser Thr  Asn Thr Ser
    1565                1570                1575

Asp Ser  Leu Met Ser Phe Leu  Glu Ser Val Asn Ile  Lys Ser Ile
    1580                1585                1590

Phe Val  Asn Phe Leu Gln Ser  Lys Ile Asn Phe Ile  Leu Asp Ala
    1595                1600                1605

Asn Phe  Ile Ile Ser Gly Thr  Thr Ser Ile Gly Gln  Phe Glu Phe
    1610                1615                1620

Ile Cys  Asp Glu Asn Asp Asn  Ile Gln Pro Tyr Phe  Ile Lys Phe
    1625                1630                1635

Asn Thr  Leu Glu Thr Thr Tyr  Thr Leu Tyr Val Gly  Asn Arg Gln
    1640                1645                1650

Asn Met  Ile Val Glu Pro Asn  Tyr Asp Leu Asp Asp  Ser Gly Asp
    1655                1660                1665

Ile Ser  Ser Thr Val Ile Asn  Phe Ser Gln Lys Tyr  Leu Tyr Gly
    1670                1675                1680

Ile Asp  Ser Cys Val Asn Lys  Val Val Ile Ser Pro  Asn Ile Tyr
    1685                1690                1695

Thr Asp  Glu Ile Asn Ile Thr  Pro Val Tyr Glu Thr  Asn Asn Asn
    1700                1705                1710
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Tyr Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys
1715 1720 1725

Ile Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser
1730 1735 1740

Asn Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn
1745 1750 1755

Lys Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp
1760 1765 1770

Lys Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln
1775 1780 1785

Asp Val Pro Val Ser Glu Ile Ile Ser Ala Phe Thr Pro Ser Tyr
1790 1795 1800

Tyr Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu
1805 1810 1815

Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser
1820 1825 1830

Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro
1835 1840 1845

Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys
1850 1855 1860

Tyr Tyr Phe Asn Pro Thr Asn Gly Gly Ala Ala Ser Ile Gly Glu
1865 1870 1875

Thr Ile Ile Asn Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Ile
1880 1885 1890

Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Leu Lys Tyr Phe
1895 1900 1905

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```
Ala Pro  Ala Asn Thr Leu Asp  Glu Asn Leu Glu Gly  Glu Ala Ile
    1910                1915                1920

Asp Phe  Thr Gly Lys Leu Ile  Ile Asp Glu Asn Ile  Tyr Tyr Phe
    1925                1930                1935

Glu Asp  Asn Tyr Arg Gly Ala  Val Glu Trp Lys Glu  Leu Asp Gly
    1940                1945                1950

Glu Met  Tyr Tyr Phe Ser Pro  Glu Thr Gly Lys Ala  Phe Lys Gly
    1955                1960                1965

Leu Asn  Gln Ile Gly Asp Asp  Lys Tyr Tyr Phe Asn  Ser Asp Gly
    1970                1975                1980

Ile Met  Gln Lys Gly Phe Val  Ser Ile Asn Asp Lys  Lys Tyr Tyr
    1985                1990                1995

Phe Asp  Asp Ser Gly Val Met  Lys Val Gly Tyr Ile  Glu Ile Asp
    2000                2005                2010

Gly Lys  Tyr Phe Tyr Phe Ala  Glu Asn Gly Glu Met  Gln Ile Gly
    2015                2020                2025

Val Phe  Asn Thr Ser Asp Gly  Phe Lys Tyr Phe Ala  His His Asn
    2030                2035                2040

Glu Asp  Leu Gly Asn Glu Glu  Gly Glu Ala Ile Ser  Tyr Ser Gly
    2045                2050                2055

Ile Leu  Asn Phe Asn Asn Lys  Ile Tyr Tyr Phe Asp  Tyr Ser Phe
    2060                2065                2070

Thr Ala  Val Val Gly Trp Lys  Asp Leu Glu Asp Gly  Ser Lys Tyr
    2075                2080                2085

Tyr Phe  Asp Glu Asp Thr Ala  Glu Ala Tyr Val Gly  Leu Ser Leu
    2090                2095                2100
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Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln
2105 2110 2115

Val Gly Phe Val Thr Ile Asn Asn Lys Val Phe Tyr Phe Ser Asp
2120 2125 2130

Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
2135 2140 2145

Phe Tyr Ile Asp Glu Lys Gly Ile Val Gln Ile Gly Val Phe Asp
2150 2155 2160

Thr Ser Asp Glu Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn
2165 2170 2175

Asp Asn Ile Tyr Gly Gln Ala Val Asp Tyr Ser Gly Leu Val Arg
2180 2185 2190

Val Gly Glu Asp Ile Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu
2195 2200 2205

Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile
2225 2230 2235

Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Asn Gly Ile Met Arg Thr
2240 2245 2250

Gly Leu Ile Ser Phe Glu Asn Asn Asp Tyr Tyr Phe Asn Glu Asn
2255 2260 2265

Gly Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe
2270 2275 2280

Tyr Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr
2285 2290 2295

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Gln Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu
2300 2305 2310

Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu
2315 2320 2325

Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr
2330 2335 2340

Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp
2345 2350 2355

Thr Ala Gln Leu Val Ile Ser Glu
2360 2365

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<211> 2710
<212> PRT
<213> Clostridium difficile

<400> 168

Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1 5 10 15

Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
20 25 30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
35 40 45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr
50 55 60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65 70 75 80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu

```
            100                 105                 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
        115                 120                 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
    130                 135                 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
    290                 295                 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
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305 310 315 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
325 330 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
340 345 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
355 360 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
370 375 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385 390 395 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
405 410 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
420 425 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
435 440 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
450 455 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465 470 475 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
485 490 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
500 505 510

Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr

515 520 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
530 535 540

Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545 550 555 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
565 570 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
580 585 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
595 600 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
610 615 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625 630 635 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
645 650 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
660 665 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
675 680 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
690 695 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705 710 715 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser

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725 730 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
740 745 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
755 760 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
770 775 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785 790 795 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
805 810 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
820 825 830

Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
835 840 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
850 855 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865 870 875 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
885 890 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
900 905 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
915 920 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly

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930 935 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945 950 955 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
965 970 975

Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
980 985 990

Ala Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln
995 1000 1005

Leu Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val
1010 1015 1020

Leu Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu
1025 1030 1035

Asp Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu
1040 1045 1050

His Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val
1055 1060 1065

Leu Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser
1070 1075 1080

Ile Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile
1085 1090 1095

Ala Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu
1100 1105 1110

Ile Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His
1115 1120 1125

Leu Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp

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1130 1135 1140

Lys Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp
1145 1150 1155

Phe Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala
1160 1165 1170

Met Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His
1175 1180 1185

Phe Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser
1190 1195 1200

Ile Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser
1205 1210 1215

Lys Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp
1220 1225 1230

Trp Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp
1235 1240 1245

Gly Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys
1250 1255 1260

Phe Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr
1265 1270 1275

Leu Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp
1280 1285 1290

Lys Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu
1295 1300 1305

Ile Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr
1310 1315 1320

Tyr Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn

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1325 1330 1335

Leu Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val
1340 1345 1350

Arg Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu
1355 1360 1365

Ile Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu
1370 1375 1380

Ile Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn
1385 1390 1395

Lys Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile
1400 1405 1410

Ser Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu
1415 1420 1425

Leu Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn
1430 1435 1440

Thr Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile
1445 1450 1455

Ala Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala
1460 1465 1470

Ile Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp
1475 1480 1485

Ser Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe
1490 1495 1500

Asn Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys
1505 1510 1515

Asp Asp Val Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn

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1520 1525 1530

Thr Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn
1535 1540 1545

Gln Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser
1550 1555 1560

Ser Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr
1565 1570 1575

Ser Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys
1580 1585 1590

Leu Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe
1595 1600 1605

Thr Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys
1610 1615 1620

Asp Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr
1625 1630 1635

Ser Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val
1640 1645 1650

Val Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser
1655 1660 1665

Thr Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg
1670 1675 1680

Tyr Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu
1685 1690 1695

Ile Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu
1700 1705 1710

Ile Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile

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1715 1720 1725

Asn Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly
1730 1735 1740

Ser Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys
1745 1750 1755

Ile Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln
1760 1765 1770

Ser Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu
1775 1780 1785

Ser Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu
1790 1795 1800

Asn Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn
1805 1810 1815

Lys Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu
1820 1825 1830

Ile Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe
1835 1840 1845

Asn Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr
1850 1855 1860

Phe Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile
1865 1870 1875

Asn Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu
1880 1885 1890

Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala
1895 1900 1905

Asn Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln

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1910 1915 1920

Ser Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn
1925 1930 1935

Asn Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys
1940 1945 1950

Tyr Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln
1955 1960 1965

Val Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile
1970 1975 1980

Ile Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe
1985 1990 1995

Asp Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp
2000 2005 2010

Gly Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly
2015 2020 2025

Val Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2030 2035 2040

Thr Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
2045 2050 2055

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
2060 2065 2070

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr
2075 2080 2085

Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr
2090 2095 2100

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala

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2105 2110 2115

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2120 2125 2130

Thr Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
2135 2140 2145

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2150 2155 2160

Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2165 2170 2175

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu
2180 2185 2190

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser
2195 2200 2205

Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile
2225 2230 2235

Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn
2240 2245 2250

Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn
2255 2260 2265

Asn Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly
2270 2275 2280

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu
2285 2290 2295

Gly Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly

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2300 2305 2310

Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp
2315 2320 2325

Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala
2330 2335 2340

Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr
2345 2350 2355

Phe Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2360 2365 2370

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser
2375 2380 2385

Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr
2390 2395 2400

Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe
2405 2410 2415

Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly
2420 2425 2430

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2435 2440 2445

Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg
2450 2455 2460

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val
2465 2470 2475

Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
2480 2485 2490

Asn Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser

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2495 2500 2505

Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly
2510 2515 2520

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2525 2530 2535

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2540 2545 2550

Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn
2555 2560 2565

Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr
2570 2575 2580

Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr
2585 2590 2595

Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile
2600 2605 2610

Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala
2615 2620 2625

Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln
2630 2635 2640

Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val

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2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly
2705 2710

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<211> 2710
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<400> 169

Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1 5 10 15

Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
20 25 30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
35 40 45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn
50 55 60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65 70 75 80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
100 105 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
115 120 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
130 135 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145 150 155 160

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```
Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Val Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
    290                 295                 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
                325                 330                 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
            340                 345                 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
        355                 360                 365
```

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```
Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
    370                 375                 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385                 390                 395                 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
                405                 410                 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
            420                 425                 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
        435                 440                 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
    450                 455                 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465                 470                 475                 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
                485                 490                 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
            500                 505                 510

Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
        515                 520                 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
    530                 535                 540

Asp Asn Glu Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545                 550                 555                 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
                565                 570                 575
```

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```
Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
            580                 585                 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
        595                 600                 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
    610                 615                 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625                 630                 635                 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
                645                 650                 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
            660                 665                 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
        675                 680                 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
    690                 695                 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705                 710                 715                 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser
                725                 730                 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
            740                 745                 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
        755                 760                 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
    770                 775                 780
```

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```
Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785                 790                 795                 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Thr Ser Val Ser
                805                 810                 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
            820                 825                 830

Ser Val Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
        835                 840                 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
    850                 855                 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865                 870                 875                 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
                885                 890                 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
            900                 905                 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
        915                 920                 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
    930                 935                 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945                 950                 955                 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
                965                 970                 975

Lys Asp Leu Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
            980                 985                 990
```

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Ala Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln
995 1000 1005

Leu Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val
1010 1015 1020

Leu Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu
1025 1030 1035

Asp Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu
1040 1045 1050

His Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val
1055 1060 1065

Leu Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser
1070 1075 1080

Ile Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile
1085 1090 1095

Ala Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu
1100 1105 1110

Ile Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His
1115 1120 1125

Leu Ser Glu Ser Lys Glu Tyr Gly Pro Leu Lys Thr Glu Asp Asp
1130 1135 1140

Lys Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp
1145 1150 1155

Phe Asn Asn Asn Ala Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala
1160 1165 1170

Met Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His
1175 1180 1185

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```
Phe Phe  Ser Ser Pro Ser Ile  Ser Ser His Ile Pro  Ser Leu Ser
    1190                1195                1200

Ile Tyr  Ser Ala Ile Gly Ile  Lys Thr Glu Asn Leu  Asp Phe Ser
    1205                1210                1215

Lys Lys  Ile Met Met Leu Pro  Asn Ala Pro Ser Arg  Val Phe Trp
    1220                1225                1230

Trp Glu  Thr Gly Ala Val Pro  Gly Leu Arg Ser Leu  Glu Asn Asn
    1235                1240                1245

Gly Thr  Lys Leu Leu Asp Ser  Ile Arg Asp Leu Tyr  Pro Gly Lys
    1250                1255                1260

Phe Tyr  Trp Arg Phe Tyr Ala  Phe Phe Asp Tyr Ala  Ile Thr Thr
    1265                1270                1275

Leu Lys  Pro Val Tyr Glu Asp  Thr Asn Ile Lys Ile  Lys Leu Asp
    1280                1285                1290

Lys Asp  Thr Arg Asn Phe Ile  Met Pro Thr Ile Thr  Thr Asn Glu
    1295                1300                1305

Ile Arg  Asn Lys Leu Ser Tyr  Ser Phe Asp Gly Ala  Gly Gly Thr
    1310                1315                1320

Tyr Ser  Leu Leu Leu Ser Ser  Tyr Pro Ile Ser Thr  Asn Ile Asn
    1325                1330                1335

Leu Ser  Lys Asp Asp Leu Trp  Ile Phe Asn Ile Asp  Asn Glu Val
    1340                1345                1350

Arg Glu  Ile Ser Ile Glu Asn  Gly Thr Ile Lys Lys  Gly Lys Leu
    1355                1360                1365

Ile Lys  Asp Val Leu Ser Lys  Ile Asp Ile Asn Lys  Asn Lys Leu
    1370                1375                1380
```

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```
Ile Ile  Gly Asn Gln Thr Ile  Asp Phe Ser Gly Asp  Ile Asp Asn
    1385                1390                1395

Lys Asp  Arg Tyr Ile Phe Leu  Thr Cys Glu Leu Asp  Asp Lys Ile
    1400                1405                1410

Ser Leu  Ile Ile Glu Ile Asn  Leu Val Ala Lys Ser  Tyr Ser Leu
    1415                1420                1425

Leu Leu  Ser Gly Asp Lys Asn  Tyr Leu Ile Ser Asn  Leu Ser Asn
    1430                1435                1440

Thr Ile  Glu Lys Ile Asn Thr  Leu Gly Leu Asp Ser  Lys Asn Ile
    1445                1450                1455

Ala Tyr  Asn Tyr Thr Asp Glu  Ser Asn Asn Lys Tyr  Phe Gly Ala
    1460                1465                1470

Ile Ser  Lys Thr Ser Gln Lys  Ser Ile Ile His Tyr  Lys Lys Asp
    1475                1480                1485

Ser Lys  Asn Ile Leu Glu Phe  Tyr Asn Gly Ser Thr  Leu Glu Phe
    1490                1495                1500

Asn Ser  Lys Asp Phe Ile Ala  Glu Asp Ile Asn Val  Phe Met Lys
    1505                1510                1515

Asp Asp  Ile Asn Thr Ile Thr  Gly Lys Tyr Tyr Val  Asp Asn Asn
    1520                1525                1530

Thr Asp  Lys Ser Ile Asp Phe  Ser Ile Ser Leu Val  Ser Lys Asn
    1535                1540                1545

Gln Ala  Lys Val Asn Gly Leu  Tyr Leu Asn Glu Ser  Val Tyr Ser
    1550                1555                1560

Ser Tyr  Leu Asp Phe Val Lys  Asn Ala Asp Gly His  His Asn Thr
    1565                1570                1575
```

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```
Ser Asn  Phe Met Asn Leu Phe  Leu Asp Asn Ile Ser  Phe Trp Lys
    1580                1585                1590

Leu Phe  Gly Phe Glu Asn Ile  Asn Phe Val Val Asp  Lys Tyr Phe
    1595                1600                1605

Thr Leu  Val Gly Lys Thr Asn  Leu Gly Tyr Val Glu  Phe Ile Cys
    1610                1615                1620

Asp Asn  Asn Lys Asn Ile Asp  Ile Tyr Phe Gly Glu  Trp Lys Thr
    1625                1630                1635

Ser Ser  Ser Lys Ser Thr Ile  Phe Ser Gly Asn Gly  Arg Asn Val
    1640                1645                1650

Val Val  Glu Pro Ile Tyr Asn  Pro Asp Thr Gly Glu  Asp Ile Ser
    1655                1660                1665

Thr Ser  Leu Asp Phe Ser Tyr  Glu Pro Leu Tyr Gly  Ile Asp Arg
    1670                1675                1680

Tyr Ile  Asn Lys Val Leu Ile  Ala Pro Asp Leu Tyr  Thr Ser Leu
    1685                1690                1695

Ile Asn  Ile Asn Thr Asn Tyr  Tyr Ser Asn Glu Tyr  Tyr Pro Glu
    1700                1705                1710

Ile Ile  Val Leu Asn Pro Asn  Thr Phe His Lys Lys  Val Asn Ile
    1715                1720                1725

Asn Leu  Asp Ser Ser Ser Phe  Glu Tyr Lys Trp Ser  Thr Glu Gly
    1730                1735                1740

Ser Asp  Phe Ile Leu Val Arg  Tyr Leu Glu Glu Ser  Asn Lys Lys
    1745                1750                1755

Ile Leu  Gln Lys Ile Arg Ile  Lys Gly Ile Leu Ser  Asn Thr Gln
    1760                1765                1770
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Ser Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu
1775 1780 1785

Ser Leu Val Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu
1790 1795 1800

Asn Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn
1805 1810 1815

Lys Thr Tyr Tyr Tyr Asp Glu Ala Ser Lys Leu Val Lys Gly Leu
1820 1825 1830

Ile Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Ser
1835 1840 1845

Asn Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr
1850 1855 1860

Phe Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile
1865 1870 1875

Asn Gly Lys His Phe Tyr Phe Asn Asn Asn Gly Val Met Gln Leu
1880 1885 1890

Gly Val Phe Lys Gly Pro Asp Arg Phe Glu Tyr Phe Ala Pro Ala
1895 1900 1905

Asn Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln
1910 1915 1920

Ser Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn
1925 1930 1935

Asp Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys
1940 1945 1950

Tyr Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln
1955 1960 1965

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```
Val Ile  Asp Asn Asn Lys Tyr  Tyr Phe Asn Pro Asp  Thr Ala Ile
    1970                1975                1980

Ile Ser  Lys Gly Trp Gln Thr  Val Asn Gly Ser Arg  Tyr Tyr Phe
    1985                1990                1995

Asp Thr  Asp Thr Ala Ile Ala  Phe Asn Gly Tyr Lys  Thr Ile Asp
    2000                2005                2010

Gly Lys  His Phe Tyr Phe Asp  Ser Asp Cys Val Val  Lys Ile Gly
    2015                2020                2025

Val Phe  Ser Gly Ser Asn Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2030                2035                2040

Thr Tyr  Asn Asn Asn Ile Glu  Gly Gln Ala Ile Val  Tyr Gln Ser
    2045                2050                2055

Lys Phe  Leu Thr Leu Asn Gly  Lys Lys Tyr Tyr Phe  Asp Asn Asn
    2060                2065                2070

Ser Lys  Ala Val Thr Gly Trp  Gln Thr Ile Asp Ser  Lys Lys Tyr
    2075                2080                2085

Tyr Phe  Asn Thr Asn Thr Ala  Glu Ala Ala Thr Gly  Trp Gln Thr
    2090                2095                2100

Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr Asn Thr  Ala Glu Ala
    2105                2110                2115

Ala Thr  Gly Trp Gln Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn
    2120                2125                2130

Thr Asn  Thr Ser Ile Ala Ser  Thr Gly Tyr Thr Ile  Ile Asn Gly
    2135                2140                2145

Lys His  Phe Tyr Phe Asn Thr  Asp Gly Ile Met Gln  Ile Gly Val
    2150                2155                2160
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Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2165 2170 2175

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Lys
2180 2185 2190

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Ala Ser Asp Ser
2195 2200 2205

Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Asn Asn Ala Ile Ala Ala Thr His Leu Tyr Thr Ile
2225 2230 2235

Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn
2240 2245 2250

Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn
2255 2260 2265

Asn Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly
2270 2275 2280

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu
2285 2290 2295

Gly Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly
2300 2305 2310

Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp
2315 2320 2325

Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala
2330 2335 2340

Val Ala Val Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr
2345 2350 2355

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```
Phe Asn  Thr Asn Thr Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile
    2360                2365                2370

Asp Gly  Lys Lys Tyr Tyr Phe  Asn Thr Asn Thr Ser  Ile Ala Ser
    2375                2380                2385

Thr Gly  Tyr Thr Ile Ile Asn  Gly Lys His Phe Tyr  Phe Asn Thr
    2390                2395                2400

Asp Gly  Ile Met Gln Ile Gly  Val Phe Lys Gly Pro  Asp Gly Phe
    2405                2410                2415

Glu Tyr  Phe Ala Pro Ala Asn  Thr Asp Ala Asn Asn  Ile Glu Gly
    2420                2425                2430

Gln Ala  Ile Leu Tyr Gln Asn  Lys Phe Leu Thr Leu  Asn Gly Lys
    2435                2440                2445

Lys Tyr  Tyr Phe Ala Ser Asp  Ser Lys Ala Val Thr  Gly Leu Arg
    2450                2455                2460

Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn Thr Asn  Thr Ala Glu
    2465                2470                2475

Ala Ala  Thr Gly Trp Gln Thr  Ile Asn Gly Lys Lys  Tyr Tyr Phe
    2480                2485                2490

Asn Thr  Asn Thr Ser Ile Ala  Ser Thr Gly Tyr Thr  Ile Ile Asn
    2495                2500                2505

Gly Lys  His Phe Tyr Phe Asn  Thr Asp Gly Ile Met  Gln Ile Gly
    2510                2515                2520

Val Phe  Lys Gly Pro Asp Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2525                2530                2535

Thr Asp  Ala Asn Asn Ile Glu  Gly Gln Ala Ile Arg  Tyr Gln Asn
    2540                2545                2550
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Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn
2555 2560 2565

Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Arg Arg Tyr
2570 2575 2580

Tyr Phe Glu Pro Asn Thr Ala Ile Gly Ala Asn Gly Tyr Lys Ile
2585 2590 2595

Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile
2600 2605 2610

Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala
2615 2620 2625

Asn Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg Tyr Gln
2630 2635 2640

Asn Arg Phe Leu His Leu Leu Gly Asn Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Asn Met
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly
2705 2710

<210> 170
<211> 2710
<212> PRT
<213> Clostridium difficile

<400> 170

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```
Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1               5                  10                  15

Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
            20                  25                  30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
        35                  40                  45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn
    50                  55                  60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65                  70                  75                  80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
            100                 105                 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
        115                 120                 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
    130                 135                 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Val Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205
```

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```
Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
    290                 295                 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
                325                 330                 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
            340                 345                 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
        355                 360                 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
    370                 375                 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385                 390                 395                 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
                405                 410                 415
```

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```
Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
            420                 425                 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
        435                 440                 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
    450                 455                 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465                 470                 475                 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
                485                 490                 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
            500                 505                 510

Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
        515                 520                 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
    530                 535                 540

Asp Asn Glu Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545                 550                 555                 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
                565                 570                 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
            580                 585                 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
        595                 600                 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
    610                 615                 620
```

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```
Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625                 630                 635                 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
                645                 650                 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
            660                 665                 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
        675                 680                 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
    690                 695                 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705                 710                 715                 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser
                725                 730                 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
            740                 745                 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
        755                 760                 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
    770                 775                 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785                 790                 795                 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Thr Ser Val Ser
                805                 810                 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
            820                 825                 830
```

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```
Ser Val Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
        835                 840                 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
    850                 855                 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865                 870                 875                 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
                885                 890                 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
            900                 905                 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
        915                 920                 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
    930                 935                 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945                 950                 955                 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
                965                 970                 975

Lys Asp Leu Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
            980                 985                 990

Ala Gln Leu Phe Ser Thr Gly Leu  Asn Thr Ile Tyr Asp  Ser Ile Gln
        995                 1000                1005

Leu Val  Asn Leu Ile Ser Asn  Ala Val Asn Asp Thr  Ile Asn Val
    1010                1015                1020

Leu Pro  Thr Ile Thr Glu Gly  Ile Pro Ile Val Ser  Thr Ile Leu
    1025                1030                1035
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Asp Gly  Ile Asn Leu Gly Ala  Ala Ile Lys Glu Leu  Leu Asp Glu
    1040                1045                1050

His Asp  Pro Leu Leu Lys Lys  Glu Leu Glu Ala Lys  Val Gly Val
    1055                1060                1065

Leu Ala  Ile Asn Met Ser Leu  Ser Ile Ala Ala Thr  Val Ala Ser
    1070                1075                1080

Ile Val  Gly Ile Gly Ala Glu  Val Thr Ile Phe Leu  Leu Pro Ile
    1085                1090                1095

Ala Gly  Ile Ser Ala Gly Ile  Pro Ser Leu Val Asn  Asn Glu Leu
    1100                1105                1110

Ile Leu  His Asp Lys Ala Thr  Ser Val Val Asn Tyr  Phe Asn His
    1115                1120                1125

Leu Ser  Glu Ser Lys Glu Tyr  Gly Pro Leu Lys Thr  Glu Asp Asp
    1130                1135                1140

Lys Ile  Leu Val Pro Ile Asp  Asp Leu Val Ile Ser  Glu Ile Asp
    1145                1150                1155

Phe Asn  Asn Asn Ala Ile Lys  Leu Gly Thr Cys Asn  Ile Leu Ala
    1160                1165                1170

Met Glu  Gly Gly Ser Gly His  Thr Val Thr Gly Asn  Ile Asp His
    1175                1180                1185

Phe Phe  Ser Ser Pro Ser Ile  Ser Ser His Ile Pro  Ser Leu Ser
    1190                1195                1200

Ile Tyr  Ser Ala Ile Gly Ile  Lys Thr Glu Asn Leu  Asp Phe Ser
    1205                1210                1215

Lys Lys  Ile Met Met Leu Pro  Asn Ala Pro Ser Arg  Val Phe Trp
    1220                1225                1230
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Trp Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asn
1235 1240 1245

Gly Thr Lys Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys
1250 1255 1260

Phe Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr
1265 1270 1275

Leu Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp
1280 1285 1290

Lys Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu
1295 1300 1305

Ile Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr
1310 1315 1320

Tyr Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn
1325 1330 1335

Leu Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val
1340 1345 1350

Arg Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu
1355 1360 1365

Ile Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu
1370 1375 1380

Ile Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn
1385 1390 1395

Lys Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile
1400 1405 1410

Ser Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu
1415 1420 1425

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Leu Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn
1430 1435 1440

Thr Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile
1445 1450 1455

Ala Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala
1460 1465 1470

Ile Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp
1475 1480 1485

Ser Lys Asn Ile Leu Glu Phe Tyr Asn Gly Ser Thr Leu Glu Phe
1490 1495 1500

Asn Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys
1505 1510 1515

Asp Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn
1520 1525 1530

Thr Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn
1535 1540 1545

Gln Ala Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser
1550 1555 1560

Ser Tyr Leu Asp Phe Val Lys Asn Ala Asp Gly His His Asn Thr
1565 1570 1575

Ser Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys
1580 1585 1590

Leu Phe Gly Phe Glu Asn Ile Asn Phe Val Val Asp Lys Tyr Phe
1595 1600 1605

Thr Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys
1610 1615 1620

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Asp Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr
1625 1630 1635

Ser Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val
1640 1645 1650

Val Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser
1655 1660 1665

Thr Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg
1670 1675 1680

Tyr Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu
1685 1690 1695

Ile Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu
1700 1705 1710

Ile Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile
1715 1720 1725

Asn Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly
1730 1735 1740

Ser Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys
1745 1750 1755

Ile Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln
1760 1765 1770

Ser Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu
1775 1780 1785

Ser Leu Val Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu
1790 1795 1800

Asn Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn
1805 1810 1815

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```
Lys Thr  Tyr Tyr Tyr Asp Glu  Ala Ser Lys Leu Val  Lys Gly Leu
    1820                1825                1830

Ile Asn  Ile Asn Asn Ser Leu  Phe Tyr Phe Asp Pro  Ile Glu Ser
    1835                1840                1845

Asn Leu  Val Thr Gly Trp Gln  Thr Ile Asn Gly Lys  Lys Tyr Tyr
    1850                1855                1860

Phe Asp  Ile Asn Thr Gly Ala  Ala Leu Thr Ser Tyr  Lys Ile Ile
    1865                1870                1875

Asn Gly  Lys His Phe Tyr Phe  Asn Asn Asn Gly Val  Met Gln Leu
    1880                1885                1890

Gly Val  Phe Lys Gly Pro Asp  Arg Phe Glu Tyr Phe  Ala Pro Ala
    1895                1900                1905

Asn Thr  Gln Asn Asn Asn Ile  Glu Gly Gln Ala Ile  Val Tyr Gln
    1910                1915                1920

Ser Lys  Phe Leu Thr Leu Asn  Gly Lys Lys Tyr Tyr  Phe Asp Asn
    1925                1930                1935

Asp Ser  Lys Ala Val Thr Gly  Trp Arg Ile Ile Asn  Asn Glu Lys
    1940                1945                1950

Tyr Tyr  Phe Asn Pro Asn Asn  Ala Ile Ala Ala Val  Gly Leu Gln
    1955                1960                1965

Val Ile  Asp Asn Asn Lys Tyr  Tyr Phe Asn Pro Asp  Thr Ala Ile
    1970                1975                1980

Ile Ser  Lys Gly Trp Gln Thr  Val Asn Gly Ser Arg  Tyr Tyr Phe
    1985                1990                1995

Asp Thr  Asp Thr Ala Ile Ala  Phe Asn Gly Tyr Lys  Thr Ile Asp
    2000                2005                2010
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```
Gly Lys  His Phe Tyr Phe Asp  Ser Asp Cys Val Val  Lys Ile Gly
    2015                 2020                 2025

Val Phe  Ser Gly Ser Asn Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2030                 2035                 2040

Thr Tyr  Asn Asn Asn Ile Glu  Gly Gln Ala Ile Val  Tyr Gln Ser
    2045                 2050                 2055

Lys Phe  Leu Thr Leu Asn Gly  Lys Lys Tyr Tyr Phe  Asp Asn Asn
    2060                 2065                 2070

Ser Lys  Ala Val Thr Gly Trp  Gln Thr Ile Asp Ser  Lys Lys Tyr
    2075                 2080                 2085

Tyr Phe  Asn Thr Asn Thr Ala  Glu Ala Ala Thr Gly  Trp Gln Thr
    2090                 2095                 2100

Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr Asn Thr  Ala Glu Ala
    2105                 2110                 2115

Ala Thr  Gly Trp Gln Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn
    2120                 2125                 2130

Thr Asn  Thr Ser Ile Ala Ser  Thr Gly Tyr Thr Ile  Ile Asn Gly
    2135                 2140                 2145

Lys His  Phe Tyr Phe Asn Thr  Asp Gly Ile Met Gln  Ile Gly Val
    2150                 2155                 2160

Phe Lys  Gly Pro Asn Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr
    2165                 2170                 2175

Asp Ala  Asn Asn Ile Glu Gly  Gln Ala Ile Leu Tyr  Gln Asn Lys
    2180                 2185                 2190

Phe Leu  Thr Leu Asn Gly Lys  Lys Tyr Tyr Phe Ala  Ser Asp Ser
    2195                 2200                 2205
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Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Asn Asn Ala Ile Ala Ala Thr His Leu Tyr Thr Ile
2225 2230 2235

Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn
2240 2245 2250

Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn
2255 2260 2265

Asn Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly
2270 2275 2280

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu
2285 2290 2295

Gly Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly
2300 2305 2310

Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp
2315 2320 2325

Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala
2330 2335 2340

Val Ala Val Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr
2345 2350 2355

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2360 2365 2370

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ser Ile Ala Ser
2375 2380 2385

Thr Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr Phe Asn Thr
2390 2395 2400

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```
Asp Gly  Ile Met Gln Ile Gly  Val Phe Lys Gly Pro  Asp Gly Phe
    2405                2410                2415

Glu Tyr  Phe Ala Pro Ala Asn  Thr Asp Ala Asn Asn  Ile Glu Gly
    2420                2425                2430

Gln Ala  Ile Leu Tyr Gln Asn  Lys Phe Leu Thr Leu  Asn Gly Lys
    2435                2440                2445

Lys Tyr  Tyr Phe Ala Ser Asp  Ser Lys Ala Val Thr  Gly Leu Arg
    2450                2455                2460

Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn Thr Asn  Thr Ala Glu
    2465                2470                2475

Ala Ala  Thr Gly Trp Gln Thr  Ile Asp Gly Lys Lys  Tyr Tyr Phe
    2480                2485                2490

Asn Thr  Asn Thr Ser Ile Ala  Ser Thr Gly Tyr Thr  Ile Ile Asn
    2495                2500                2505

Asp Lys  His Phe Tyr Phe Asn  Thr Asp Gly Ile Met  Gln Ile Gly
    2510                2515                2520

Val Phe  Lys Gly Pro Asp Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2525                2530                2535

Thr Asp  Ala Asn Asn Ile Glu  Gly Gln Ala Ile Arg  Tyr Gln Asn
    2540                2545                2550

Arg Phe  Leu Tyr Leu His Asp  Asn Ile Tyr Tyr Phe  Gly Asn Asn
    2555                2560                2565

Ser Lys  Ala Ala Thr Gly Trp  Val Thr Ile Asp Gly  Arg Arg Tyr
    2570                2575                2580

Tyr Phe  Glu Pro Asn Thr Ala  Ile Gly Ala Asn Gly  Tyr Lys Ile
    2585                2590                2595
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```
Ile Asp  Asn Lys Asn Phe Tyr  Phe Arg Asn Gly Leu  Pro Gln Ile
    2600                2605                2610

Gly Val  Phe Lys Gly Pro Asn  Gly Phe Glu Tyr Phe  Ala Pro Ala
    2615                2620                2625

Asn Thr  Asp Ala Asn Asn Ile  Asp Gly Gln Ala Ile  Arg Tyr Gln
    2630                2635                2640

Asn Arg  Phe Leu His Leu Leu  Gly Asn Ile Tyr Tyr  Phe Gly Asn
    2645                2650                2655

Asn Ser  Lys Ala Val Thr Gly  Trp Gln Thr Ile Asn  Gly Asn Met
    2660                2665                2670

Tyr Tyr  Phe Met Pro Asp Thr  Ala Met Ala Ala Ala  Gly Gly Leu
    2675                2680                2685

Phe Glu  Ile Asp Gly Val Ile  Tyr Phe Phe Gly Val  Asp Gly Val
    2690                2695                2700

Lys Ala  Pro Gly Ile Tyr Gly
    2705                2710


<210>  171
<211>  2710
<212>  PRT
<213>  Clostridium difficile

<400>  171

Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1               5                  10                  15

Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
            20                  25                  30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
        35                  40                  45
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Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn
    50                  55                  60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65                  70                  75                  80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
            100                 105                 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
        115                 120                 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
    130                 135                 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Val Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255
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```
Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
    290                 295                 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
                325                 330                 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
            340                 345                 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
        355                 360                 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
    370                 375                 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385                 390                 395                 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
                405                 410                 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
            420                 425                 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
        435                 440                 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
    450                 455                 460
```

```
Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465                 470                 475                 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
                485                 490                 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
            500                 505                 510

Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
        515                 520                 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
    530                 535                 540

Asp Asn Glu Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545                 550                 555                 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
                565                 570                 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
            580                 585                 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
        595                 600                 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
    610                 615                 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625                 630                 635                 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
                645                 650                 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
            660                 665                 670
```

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```
Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
        675                 680                 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
    690                 695                 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705                 710                 715                 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser
                725                 730                 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
            740                 745                 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
        755                 760                 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
    770                 775                 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785                 790                 795                 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Thr Ser Val Ser
                805                 810                 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
            820                 825                 830

Ser Val Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
        835                 840                 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
    850                 855                 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865                 870                 875                 880
```

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Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
                885                 890                 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
            900                 905                 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
        915                 920                 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
    930                 935                 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945                 950                 955                 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
                965                 970                 975

Lys Asp Leu Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
            980                 985                 990

Ala Gln Leu Phe Ser Thr Gly Leu  Asn Thr Ile Tyr Asp  Ser Ile Gln
        995                 1000                1005

Leu Val  Asn Leu Ile Ser Asn  Ala Val Asn Asp Thr  Ile Asn Val
    1010                1015                1020

Leu Pro  Thr Ile Thr Glu Gly  Ile Pro Ile Val Ser  Thr Ile Leu
    1025                1030                1035

Asp Gly  Ile Asn Leu Gly Ala  Ala Ile Lys Glu Leu  Leu Asp Glu
    1040                1045                1050

His Asp  Pro Leu Leu Lys Lys  Glu Leu Glu Ala Lys  Val Gly Val
    1055                1060                1065

Leu Ala  Ile Asn Met Ser Leu  Ser Ile Ala Ala Thr  Val Ala Ser
    1070                1075                1080
```

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```
Ile Val  Gly Ile Gly Ala Glu  Val Thr Ile Phe Leu  Leu Pro Ile
    1085                1090                1095

Ala Gly  Ile Ser Ala Gly Ile  Pro Ser Leu Val Asn  Asn Glu Leu
    1100                1105                1110

Ile Leu  His Asp Lys Ala Thr  Ser Val Val Asn Tyr  Phe Asn His
    1115                1120                1125

Leu Ser  Glu Ser Lys Glu Tyr  Gly Pro Leu Lys Thr  Glu Asp Asp
    1130                1135                1140

Lys Ile  Leu Val Pro Ile Asp  Asp Leu Val Ile Ser  Glu Ile Asp
    1145                1150                1155

Phe Asn  Asn Asn Ala Ile Lys  Leu Gly Thr Cys Asn  Ile Leu Ala
    1160                1165                1170

Met Glu  Gly Gly Ser Gly His  Thr Val Thr Gly Asn  Ile Asp His
    1175                1180                1185

Phe Phe  Ser Ser Pro Ser Ile  Ser Ser His Ile Pro  Ser Leu Ser
    1190                1195                1200

Ile Tyr  Ser Ala Ile Gly Ile  Lys Thr Glu Asn Leu  Asp Phe Ser
    1205                1210                1215

Lys Lys  Ile Met Met Leu Pro  Asn Ala Pro Ser Arg  Val Phe Trp
    1220                1225                1230

Trp Glu  Thr Gly Ala Val Pro  Gly Leu Arg Ser Leu  Glu Asn Asn
    1235                1240                1245

Gly Thr  Lys Leu Leu Asp Ser  Ile Arg Asp Leu Tyr  Pro Gly Lys
    1250                1255                1260

Phe Tyr  Trp Arg Phe Tyr Ala  Phe Phe Asp Tyr Ala  Ile Thr Thr
    1265                1270                1275
```

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Leu Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp
1280 1285 1290

Lys Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu
1295 1300 1305

Ile Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr
1310 1315 1320

Tyr Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn
1325 1330 1335

Leu Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val
1340 1345 1350

Arg Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu
1355 1360 1365

Ile Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu
1370 1375 1380

Ile Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn
1385 1390 1395

Lys Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile
1400 1405 1410

Ser Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu
1415 1420 1425

Leu Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn
1430 1435 1440

Thr Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile
1445 1450 1455

Ala Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala
1460 1465 1470

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```
Ile Ser  Lys Thr Ser Gln Lys  Ser Ile Ile His Tyr  Lys Lys Asp
    1475                1480                1485

Ser Lys  Asn Ile Leu Glu Phe  Tyr Asn Gly Ser Thr  Leu Glu Phe
    1490                1495                1500

Asn Ser  Lys Asp Phe Ile Ala  Glu Asp Ile Asn Val  Phe Met Lys
    1505                1510                1515

Asp Asp  Ile Asn Thr Ile Thr  Gly Lys Tyr Tyr Val  Asp Asn Asn
    1520                1525                1530

Thr Asp  Lys Ser Ile Asp Phe  Ser Ile Ser Leu Val  Ser Lys Asn
    1535                1540                1545

Gln Ala  Lys Val Asn Gly Leu  Tyr Leu Asn Glu Ser  Val Tyr Ser
    1550                1555                1560

Ser Tyr  Leu Asp Phe Val Lys  Asn Ala Asp Gly His  His Asn Thr
    1565                1570                1575

Ser Asn  Phe Met Asn Leu Phe  Leu Asp Asn Ile Ser  Phe Trp Lys
    1580                1585                1590

Leu Phe  Gly Phe Glu Asn Ile  Asn Phe Val Val Asp  Lys Tyr Phe
    1595                1600                1605

Thr Leu  Val Gly Lys Thr Asn  Leu Gly Tyr Val Glu  Phe Ile Cys
    1610                1615                1620

Asp Asn  Asn Lys Asn Ile Asp  Ile Tyr Phe Gly Glu  Trp Lys Thr
    1625                1630                1635

Ser Ser  Ser Lys Ser Thr Ile  Phe Ser Gly Asn Gly  Arg Asn Val
    1640                1645                1650

Val Val  Glu Pro Ile Tyr Asn  Pro Asp Thr Gly Glu  Asp Ile Ser
    1655                1660                1665
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Thr Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg
1670 1675 1680

Tyr Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu
1685 1690 1695

Ile Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu
1700 1705 1710

Ile Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile
1715 1720 1725

Asn Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly
1730 1735 1740

Ser Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys
1745 1750 1755

Ile Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln
1760 1765 1770

Ser Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu
1775 1780 1785

Ser Leu Val Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu
1790 1795 1800

Asn Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn
1805 1810 1815

Lys Thr Tyr Tyr Tyr Asp Glu Ala Ser Lys Leu Val Lys Gly Leu
1820 1825 1830

Ile Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Ser
1835 1840 1845

Asn Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr
1850 1855 1860

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Phe Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile
1865 1870 1875

Asn Gly Lys His Phe Tyr Phe Asn Asn Asn Gly Val Met Gln Leu
1880 1885 1890

Gly Val Phe Lys Gly Pro Asp Arg Phe Glu Tyr Phe Ala Pro Ala
1895 1900 1905

Asn Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln
1910 1915 1920

Ser Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn
1925 1930 1935

Asp Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys
1940 1945 1950

Tyr Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln
1955 1960 1965

Val Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile
1970 1975 1980

Ile Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe
1985 1990 1995

Asp Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp
2000 2005 2010

Gly Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly
2015 2020 2025

Val Phe Ser Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2030 2035 2040

Thr Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
2045 2050 2055

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Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
2060 2065 2070

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr
2075 2080 2085

Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr
2090 2095 2100

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala
2105 2110 2115

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2120 2125 2130

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
2135 2140 2145

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2150 2155 2160

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2165 2170 2175

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Lys
2180 2185 2190

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Ala Ser Asp Ser
2195 2200 2205

Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Asn Asn Ala Ile Ala Ala Thr His Leu Tyr Thr Ile
2225 2230 2235

Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn
2240 2245 2250

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Gly Tyr  Ile Thr Ile Glu Arg  Asn Asn Phe Tyr Phe  Asp Ala Asn
    2255                2260                2265

Asn Glu  Ser Lys Met Val Thr  Gly Val Phe Lys Gly  Pro Asn Gly
    2270                2275                2280

Phe Glu  Tyr Phe Ala Pro Ala  Asn Thr His Asn Asn  Asn Ile Glu
    2285                2290                2295

Gly Gln  Ala Ile Val Tyr Gln  Asn Lys Phe Leu Thr  Leu Asn Gly
    2300                2305                2310

Lys Lys  Tyr Tyr Phe Asp Asn  Asp Ser Lys Ala Val  Thr Gly Trp
    2315                2320                2325

Gln Thr  Ile Asp Gly Lys Lys  Tyr Tyr Phe Asn Leu  Asn Thr Ala
    2330                2335                2340

Val Ala  Val Thr Gly Trp Gln  Thr Ile Asp Gly Lys  Lys Tyr Tyr
    2345                2350                2355

Phe Asn  Thr Asn Thr Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile
    2360                2365                2370

Asp Gly  Lys Lys Tyr Tyr Phe  Asn Thr Asn Thr Ser  Ile Ala Ser
    2375                2380                2385

Thr Gly  Tyr Thr Ile Ile Asn  Gly Lys His Phe Tyr  Phe Asn Thr
    2390                2395                2400

Asp Gly  Ile Met Gln Ile Gly  Val Phe Lys Gly Pro  Asp Gly Phe
    2405                2410                2415

Glu Tyr  Phe Ala Pro Ala Asn  Thr Asp Ala Asn Asn  Ile Glu Gly
    2420                2425                2430

Gln Ala  Ile Leu Tyr Gln Asn  Lys Phe Leu Thr Leu  Asn Gly Lys
    2435                2440                2445
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Lys Tyr Tyr Phe Ala Ser Asp Ser Lys Ala Val Thr Gly Leu Arg
2450 2455 2460

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu
2465 2470 2475

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2480 2485 2490

Asn Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn
2495 2500 2505

Asp Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly
2510 2515 2520

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2525 2530 2535

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2540 2545 2550

Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn
2555 2560 2565

Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Arg Arg Tyr
2570 2575 2580

Tyr Phe Glu Pro Asn Thr Ala Ile Gly Ala Asn Gly Tyr Lys Ile
2585 2590 2595

Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile
2600 2605 2610

Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala
2615 2620 2625

Asn Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg Tyr Gln
2630 2635 2640

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Asn Arg Phe Leu His Leu Leu Gly Asn Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Asn Met
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
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Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
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Lys Ala Pro Gly Ile Tyr Gly
2705 2710

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<400> 172

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Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
20 25 30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
35 40 45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn
50 55 60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65 70 75 80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu

```
            100                 105                 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
        115                 120                 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
    130                 135                 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Val Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
    290                 295                 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
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305 310 315 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
325 330 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
340 345 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
355 360 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
370 375 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385 390 395 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
405 410 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
420 425 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
435 440 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
450 455 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465 470 475 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
485 490 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
500 505 510

Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr

515 520 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
530 535 540

Asp Asn Glu Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545 550 555 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
565 570 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
580 585 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
595 600 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
610 615 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625 630 635 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
645 650 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
660 665 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
675 680 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
690 695 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705 710 715 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser

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725 730 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
740 745 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
755 760 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
770 775 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785 790 795 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Thr Ser Val Ser
805 810 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
820 825 830

Ser Val Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
835 840 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
850 855 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865 870 875 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
885 890 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
900 905 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
915 920 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly

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930 935 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945 950 955 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
965 970 975

Lys Asp Leu Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
980 985 990

Ala Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln
995 1000 1005

Leu Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val
1010 1015 1020

Leu Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu
1025 1030 1035

Asp Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu
1040 1045 1050

His Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val
1055 1060 1065

Leu Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser
1070 1075 1080

Ile Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile
1085 1090 1095

Ala Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu
1100 1105 1110

Ile Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His
1115 1120 1125

Leu Ser Glu Ser Lys Glu Tyr Gly Pro Leu Lys Thr Glu Asp Asp

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1130 1135 1140

Lys Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp
1145 1150 1155

Phe Asn Asn Asn Ala Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala
1160 1165 1170

Met Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His
1175 1180 1185

Phe Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser
1190 1195 1200

Ile Tyr Ser Ala Ile Gly Ile Lys Thr Glu Asn Leu Asp Phe Ser
1205 1210 1215

Lys Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp
1220 1225 1230

Trp Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asn
1235 1240 1245

Gly Thr Lys Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys
1250 1255 1260

Phe Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr
1265 1270 1275

Leu Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp
1280 1285 1290

Lys Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu
1295 1300 1305

Ile Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr
1310 1315 1320

Tyr Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn

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1325 1330 1335

Leu Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val
1340 1345 1350

Arg Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu
1355 1360 1365

Ile Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu
1370 1375 1380

Ile Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn
1385 1390 1395

Lys Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile
1400 1405 1410

Ser Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu
1415 1420 1425

Leu Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn
1430 1435 1440

Thr Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile
1445 1450 1455

Ala Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala
1460 1465 1470

Ile Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp
1475 1480 1485

Ser Lys Asn Ile Leu Glu Phe Tyr Asn Gly Ser Thr Leu Glu Phe
1490 1495 1500

Asn Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys
1505 1510 1515

Asp Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn

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1520 1525 1530

Thr Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn
1535 1540 1545

Gln Ala Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser
1550 1555 1560

Ser Tyr Leu Asp Phe Val Lys Asn Ala Asp Gly His His Asn Thr
1565 1570 1575

Ser Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys
1580 1585 1590

Leu Phe Gly Phe Glu Asn Ile Asn Phe Val Val Asp Lys Tyr Phe
1595 1600 1605

Thr Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys
1610 1615 1620

Asp Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr
1625 1630 1635

Ser Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val
1640 1645 1650

Val Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser
1655 1660 1665

Thr Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg
1670 1675 1680

Tyr Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu
1685 1690 1695

Ile Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu
1700 1705 1710

Ile Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile

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1715 1720 1725

Asn Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly
1730 1735 1740

Ser Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys
1745 1750 1755

Ile Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln
1760 1765 1770

Ser Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu
1775 1780 1785

Ser Leu Val Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu
1790 1795 1800

Asn Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn
1805 1810 1815

Lys Thr Tyr Tyr Tyr Asp Glu Ala Ser Lys Leu Val Lys Gly Leu
1820 1825 1830

Ile Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Ser
1835 1840 1845

Asn Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr
1850 1855 1860

Phe Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile
1865 1870 1875

Asn Gly Lys His Phe Tyr Phe Asn Asn Asn Gly Val Met Gln Leu
1880 1885 1890

Gly Val Phe Lys Gly Pro Asp Arg Phe Glu Tyr Phe Ala Pro Ala
1895 1900 1905

Asn Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln

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1910 1915 1920

Ser Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn
1925 1930 1935

Asp Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys
1940 1945 1950

Tyr Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln
1955 1960 1965

Val Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile
1970 1975 1980

Ile Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe
1985 1990 1995

Asp Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp
2000 2005 2010

Gly Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly
2015 2020 2025

Val Phe Ser Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2030 2035 2040

Thr Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
2045 2050 2055

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
2060 2065 2070

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr
2075 2080 2085

Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr
2090 2095 2100

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala

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2105 2110 2115

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
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Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
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Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
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Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2165 2170 2175

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Lys
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Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Ala Ser Asp Ser
2195 2200 2205

Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Asn Asn Ala Ile Ala Ala Thr His Leu Tyr Thr Ile
2225 2230 2235

Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn
2240 2245 2250

Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn
2255 2260 2265

Asn Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly
2270 2275 2280

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu
2285 2290 2295

Gly Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly

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2300 2305 2310

Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp
2315 2320 2325

Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala
2330 2335 2340

Val Ala Val Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr
2345 2350 2355

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2360 2365 2370

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ser Ile Ala Ser
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Thr Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr Phe Asn Thr
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Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly Phe
2405 2410 2415

Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly
2420 2425 2430

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2435 2440 2445

Lys Tyr Tyr Phe Ala Ser Asp Ser Lys Ala Val Thr Gly Leu Arg
2450 2455 2460

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu
2465 2470 2475

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2480 2485 2490

Asn Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn

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2495 2500 2505

Asp Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly
2510 2515 2520

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2525 2530 2535

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2540 2545 2550

Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn
2555 2560 2565

Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Arg Arg Tyr
2570 2575 2580

Tyr Phe Glu Pro Asn Thr Ala Ile Gly Ala Asn Gly Tyr Lys Ile
2585 2590 2595

Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile
2600 2605 2610

Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala
2615 2620 2625

Asn Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg Tyr Gln
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Asn Arg Phe Leu His Leu Leu Gly Asn Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Asn Met
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val

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Lys Ala Pro Gly Ile Tyr Gly
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<400> 173

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Phe Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
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Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
35 40 45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
50 55 60

Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65 70 75 80

Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys
85 90 95

Asn Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
100 105 110

Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
115 120 125

Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
130 135 140

Val Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145 150 155 160

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Leu Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met
                165                 170                 175

Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala
            180                 185                 190

Gln Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr
        195                 200                 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr
    210                 215                 220

Ile Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val
225                 230                 235                 240

Arg Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu
                245                 250                 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu
            260                 265                 270

Arg Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp
        275                 280                 285

Met Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro
    290                 295                 300

Ser Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile
305                 310                 315                 320

Met Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp
                325                 330                 335

Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
            340                 345                 350

Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala
        355                 360                 365
```

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```
Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn
    370                 375                 380

Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val
385                 390                 395                 400

Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro
                405                 410                 415

Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile
            420                 425                 430

Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met
        435                 440                 445

Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr
    450                 455                 460

Thr Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp
465                 470                 475                 480

Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala
                485                 490                 495

Asp Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr
            500                 505                 510

Glu Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys
        515                 520                 525

Ala Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly
    530                 535                 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu
545                 550                 555                 560

Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly
                565                 570                 575
```

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```
Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
            580                 585                 590

Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe
        595                 600                 605

Gln Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly
    610                 615                 620

Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile
625                 630                 635                 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp
                645                 650                 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser
            660                 665                 670

Thr Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro
        675                 680                 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser
    690                 695                 700

Ile Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys
705                 710                 715                 720

Asp Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
                725                 730                 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg
            740                 745                 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
        755                 760                 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
    770                 775                 780
```

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```
Asn Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785                 790                 795                 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu
                805                 810                 815

Glu Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
            820                 825                 830

Asp Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr
        835                 840                 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser
    850                 855                 860

Ile Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp
865                 870                 875                 880

Ser His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe
                885                 890                 895

Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
            900                 905                 910

Thr Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu
        915                 920                 925

Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
    930                 935                 940

Val Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn
945                 950                 955                 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu
                965                 970                 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
            980                 985                 990
```

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```
Leu Phe Ser Thr Gly Leu Asn Thr  Ile Thr Asp Ala Ala  Lys Val Val
        995                 1000                1005

Glu Leu  Val Ser Thr Ala Leu  Asp Glu Thr Ile Asp  Leu Leu Pro
    1010                1015                1020

Thr Leu  Ser Glu Gly Leu Pro  Ile Ile Ala Thr Ile  Ile Asp Gly
    1025                1030                1035

Val Ser  Leu Gly Ala Ala Ile  Lys Glu Leu Ser Glu  Thr Ser Asp
    1040                1045                1050

Pro Leu  Leu Arg Gln Glu Ile  Glu Ala Lys Ile Gly  Ile Met Ala
    1055                1060                1065

Val Asn  Leu Thr Thr Ala Thr  Thr Ala Ile Ile Thr  Ser Ser Leu
    1070                1075                1080

Gly Ile  Ala Ser Gly Phe Ser  Ile Leu Leu Val Pro  Leu Ala Gly
    1085                1090                1095

Ile Ser  Ala Gly Ile Pro Ser  Leu Val Asn Asn Glu  Leu Val Leu
    1100                1105                1110

Arg Asp  Lys Ala Thr Lys Val  Val Asp Tyr Phe Lys  His Val Ser
    1115                1120                1125

Leu Val  Glu Thr Glu Gly Val  Phe Thr Leu Leu Asp  Asp Lys Ile
    1130                1135                1140

Met Met  Pro Gln Asp Asp Leu  Val Ile Ser Glu Ile  Asp Phe Asn
    1145                1150                1155

Asn Asn  Ser Ile Val Leu Gly  Lys Cys Glu Ile Trp  Arg Met Glu
    1160                1165                1170

Gly Gly  Ser Gly His Thr Val  Thr Asp Asp Ile Asp  His Phe Phe
    1175                1180                1185
```

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```
Ser Ala  Pro Ser Ile Thr Tyr  Arg Glu Pro His Leu  Ser Ile Tyr
    1190                1195                1200

Asp Val  Leu Glu Val Gln Lys  Glu Glu Leu Asp Leu  Ser Lys Asp
    1205                1210                1215

Leu Met  Val Leu Pro Asn Ala  Pro Asn Arg Val Phe  Ala Trp Glu
    1220                1225                1230

Thr Gly  Trp Thr Pro Gly Leu  Arg Ser Leu Glu Asn  Asp Gly Thr
    1235                1240                1245

Lys Leu  Leu Asp Arg Ile Arg  Asp Asn Tyr Glu Gly  Glu Phe Tyr
    1250                1255                1260

Trp Arg  Tyr Phe Ala Phe Ile  Ala Asp Ala Leu Ile  Thr Thr Leu
    1265                1270                1275

Lys Pro  Arg Tyr Glu Asp Thr  Asn Ile Arg Ile Asn  Leu Asp Ser
    1280                1285                1290

Asn Thr  Arg Ser Phe Ile Val  Pro Ile Ile Thr Thr  Glu Tyr Ile
    1295                1300                1305

Arg Glu  Lys Leu Ser Tyr Ser  Phe Tyr Gly Ser Gly  Gly Thr Tyr
    1310                1315                1320

Ala Leu  Ser Leu Ser Gln Tyr  Asn Met Gly Ile Asn  Ile Glu Leu
    1325                1330                1335

Ser Glu  Ser Asp Val Trp Ile  Ile Asp Val Asp Asn  Val Val Arg
    1340                1345                1350

Asp Val  Thr Ile Glu Ser Asp  Lys Ile Lys Lys Gly  Asp Leu Ile
    1355                1360                1365

Glu Gly  Ile Leu Ser Thr Leu  Ser Ile Glu Glu Asn  Lys Ile Ile
    1370                1375                1380
```

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```
Leu Asn  Ser His Glu Ile Asn  Phe Ser Gly Glu Val  Asn Gly Ser
    1385                1390                1395

Asn Gly  Phe Val Ser Leu Thr  Phe Ser Ile Leu Glu  Gly Ile Asn
    1400                1405                1410

Ala Ile  Ile Glu Val Asp Leu  Leu Ser Lys Ser Tyr  Lys Leu Leu
    1415                1420                1425

Ile Ser  Gly Glu Leu Lys Ile  Leu Met Leu Asn Ser  Asn His Ile
    1430                1435                1440

Gln Gln  Lys Ile Asp Tyr Ile  Gly Phe Asn Ser Glu  Leu Gln Lys
    1445                1450                1455

Asn Ile  Pro Tyr Ser Phe Val  Asp Ser Glu Gly Lys  Glu Asn Gly
    1460                1465                1470

Phe Ile  Asn Gly Ser Thr Lys  Glu Gly Leu Phe Val  Ser Glu Leu
    1475                1480                1485

Pro Asp  Val Val Leu Ile Ser  Lys Val Tyr Met Asp  Asp Ser Lys
    1490                1495                1500

Pro Ser  Phe Gly Tyr Tyr Ser  Asn Asn Leu Lys Asp  Val Lys Val
    1505                1510                1515

Ile Thr  Lys Asp Asn Val Asn  Ile Leu Thr Gly Tyr  Tyr Leu Lys
    1520                1525                1530

Asp Asp  Ile Lys Ile Ser Leu  Ser Leu Thr Leu Gln  Asp Glu Lys
    1535                1540                1545

Thr Ile  Lys Leu Asn Ser Val  His Leu Asp Glu Ser  Gly Val Ala
    1550                1555                1560

Glu Ile  Leu Lys Phe Met Asn  Arg Lys Gly Asn Thr  Asn Thr Ser
    1565                1570                1575
```

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```
Asp Ser  Leu Met Ser Phe Leu  Glu Ser Met Asn Ile  Lys Ser Ile
    1580                1585                1590

Phe Val  Asn Phe Leu Gln Ser  Asn Ile Lys Phe Ile  Leu Asp Ala
    1595                1600                1605

Asn Phe  Ile Ile Ser Gly Thr  Thr Ser Ile Gly Gln  Phe Glu Phe
    1610                1615                1620

Ile Cys  Asp Glu Asn Asp Asn  Ile Gln Pro Tyr Phe  Ile Lys Phe
    1625                1630                1635

Asn Thr  Leu Glu Thr Asn Tyr  Thr Leu Tyr Val Gly  Asn Arg Gln
    1640                1645                1650

Asn Met  Ile Val Glu Pro Asn  Tyr Asp Leu Asp Asp  Ser Gly Asp
    1655                1660                1665

Ile Ser  Ser Thr Val Ile Asn  Phe Ser Gln Lys Tyr  Leu Tyr Gly
    1670                1675                1680

Ile Asp  Ser Cys Val Asn Lys  Val Val Ile Ser Pro  Asn Ile Tyr
    1685                1690                1695

Thr Asp  Glu Ile Asn Ile Thr  Pro Val Tyr Glu Thr  Asn Asn Thr
    1700                1705                1710

Tyr Pro  Glu Val Ile Val Leu  Asp Ala Asn Tyr Ile  Asn Glu Lys
    1715                1720                1725

Ile Asn  Val Asn Ile Asn Asp  Leu Ser Ile Arg Tyr  Val Trp Ser
    1730                1735                1740

Asn Asp  Gly Asn Asp Phe Ile  Leu Met Ser Thr Ser  Glu Glu Asn
    1745                1750                1755

Lys Val  Ser Gln Val Lys Ile  Arg Phe Val Asn Val  Phe Lys Asp
    1760                1765                1770
```

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Lys Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln
1775 1780 1785

Asp Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr
1790 1795 1800

Tyr Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu
1805 1810 1815

Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser
1820 1825 1830

Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro
1835 1840 1845

Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys
1850 1855 1860

Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu
1865 1870 1875

Thr Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val
1880 1885 1890

Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
1895 1900 1905

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile
1910 1915 1920

Asp Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe
1925 1930 1935

Asp Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly
1940 1945 1950

Glu Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly
1955 1960 1965

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```
Leu Asn  Gln Ile Gly Asp Asp  Lys Tyr Tyr Phe Asn  Ser Asp Gly
    1970                1975                1980

Val Met  Gln Lys Gly Phe Val  Ser Ile Asn Asp Asn  Lys His Tyr
    1985                1990                1995

Phe Asp  Asp Ser Gly Val Met  Lys Val Gly Tyr Thr  Glu Ile Asp
    2000                2005                2010

Gly Lys  His Phe Tyr Phe Ala  Glu Asn Gly Glu Met  Gln Ile Gly
    2015                2020                2025

Val Phe  Asn Thr Glu Asp Gly  Phe Lys Tyr Phe Ala  His His Asn
    2030                2035                2040

Glu Asp  Leu Gly Asn Glu Glu  Gly Glu Glu Ile Ser  Tyr Ser Gly
    2045                2050                2055

Ile Leu  Asn Phe Asn Asn Lys  Ile Tyr Tyr Phe Asp  Asp Ser Phe
    2060                2065                2070

Thr Ala  Val Val Gly Trp Lys  Asp Leu Glu Asp Gly  Ser Lys Tyr
    2075                2080                2085

Tyr Phe  Asp Glu Asp Thr Ala  Glu Ala Tyr Ile Gly  Leu Ser Leu
    2090                2095                2100

Ile Asn  Asp Gly Gln Tyr Tyr  Phe Asn Asp Asp Gly  Ile Met Gln
    2105                2110                2115

Val Gly  Phe Val Thr Ile Asn  Asp Lys Val Phe Tyr  Phe Ser Asp
    2120                2125                2130

Ser Gly  Ile Ile Glu Ser Gly  Val Gln Asn Ile Asp  Asp Asn Tyr
    2135                2140                2145

Phe Tyr  Ile Asp Asp Asn Gly  Ile Val Gln Ile Gly  Val Phe Asp
    2150                2155                2160
```

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Thr Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn
2165 2170 2175

Asp Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg
2180 2185 2190

Val Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu
2195 2200 2205

Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile
2225 2230 2235

Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr
2240 2245 2250

Gly Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn
2255 2260 2265

Gly Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe
2270 2275 2280

Tyr Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr
2285 2290 2295

Pro Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu
2300 2305 2310

Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu
2315 2320 2325

Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr
2330 2335 2340

Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp
2345 2350 2355

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Thr Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 174
<211> 2366
<212> PRT
<213> Clostridium difficile

<400> 174

Met Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg
1 5 10 15

Phe Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
20 25 30

Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
35 40 45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
50 55 60

Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65 70 75 80

Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys
85 90 95

Asn Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
100 105 110

Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
115 120 125

Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
130 135 140

Ile Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145 150 155 160

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```
Leu Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met
                165                 170                 175

Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala
            180                 185                 190

Gln Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile
        195                 200                 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr
    210                 215                 220

Ile Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val
225                 230                 235                 240

Arg Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu
                245                 250                 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu
            260                 265                 270

Arg Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp
        275                 280                 285

Met Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro
    290                 295                 300

Ser Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile
305                 310                 315                 320

Met Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp
                325                 330                 335

Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser
            340                 345                 350

Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala
        355                 360                 365
```

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```
Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn
    370                 375                 380

Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val
385                 390                 395                 400

Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro
                405                 410                 415

Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile
            420                 425                 430

Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met
        435                 440                 445

Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr
    450                 455                 460

Thr Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp
465                 470                 475                 480

Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala
                485                 490                 495

Asp Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr
            500                 505                 510

Glu Gln Glu Met Ala Ser Leu Trp Thr Phe Asp Asp Ala Arg Ala Lys
        515                 520                 525

Val Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly
    530                 535                 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu
545                 550                 555                 560

Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly
                565                 570                 575
```

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```
Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
            580                 585                 590

Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Ile Leu Phe
        595                 600                 605

Gln Lys Asn Ile Glu Asn Ser Glu Val Ala Tyr Tyr Tyr Asn Pro Gly
    610                 615                 620

Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Arg Ile Pro Ser Ile Ile
625                 630                 635                 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp
                645                 650                 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser
            660                 665                 670

Thr Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Ser
        675                 680                 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser
    690                 695                 700

Ile Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys
705                 710                 715                 720

Asp Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
                725                 730                 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Asn Glu Gly Arg Arg
            740                 745                 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
        755                 760                 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
    770                 775                 780
```

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```
Asn Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785                 790                 795                 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Leu Ser Asp Ile Glu Leu Glu
                805                 810                 815

Glu Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
            820                 825                 830

Asp Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr
        835                 840                 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser
    850                 855                 860

Ile Ser Asp Ser Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Asp Asp
865                 870                 875                 880

Ser His Phe Ile Ser Phe Glu Asp Ile Ser Lys Thr Glu Asp Gly Phe
                885                 890                 895

Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
            900                 905                 910

Thr Glu Lys Glu Ile Phe Ser Glu Tyr Ala Asn His Ile Arg Arg Glu
        915                 920                 925

Ile Ser Asn Ile Lys Asp Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
    930                 935                 940

Val Lys Lys Val Asn Leu Asp Ala Ile His Glu Val Asn Thr Leu Asn
945                 950                 955                 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Gly Tyr Ser Ser Ser Lys Glu
                965                 970                 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
            980                 985                 990
```

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Leu Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp Ala Ala Lys Val Val
995 1000 1005

Glu Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu Pro
1010 1015 1020

Thr Leu Ser Glu Gly Leu Pro Val Ile Ala Thr Ile Ile Asp Gly
1025 1030 1035

Val Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp
1040 1045 1050

Pro Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala
1055 1060 1065

Val Asn Leu Thr Ala Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu
1070 1075 1080

Gly Ile Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly
1085 1090 1095

Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu
1100 1105 1110

Arg Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Ile Ser
1115 1120 1125

Leu Val Glu Thr Glu Gly Ala Phe Thr Leu Leu Asp Asp Lys Ile
1130 1135 1140

Met Ile Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn
1145 1150 1155

Asn Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu
1160 1165 1170

Gly Gly Ser Gly His Thr Val Thr Asn Asp Ile Asp His Phe Phe
1175 1180 1185

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Ser Ser Pro Thr Ile Thr Tyr Ile Lys Pro His Leu Ser Ile Tyr
1190 1195 1200

Asp Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp
1205 1210 1215

Leu Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu
1220 1225 1230

Thr Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Glu Gly Thr
1235 1240 1245

Lys Leu Leu Asp Arg Ile Arg Asp His Tyr Lys Gly Glu Phe Tyr
1250 1255 1260

Trp Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu
1265 1270 1275

Lys Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser
1280 1285 1290

Asn Asn Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu His Ile
1295 1300 1305

Arg Glu Lys Leu Ser Tyr Ser Phe His Gly Ser Gly Gly Thr Tyr
1310 1315 1320

Ala Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu
1325 1330 1335

Ser Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg
1340 1345 1350

Asp Val Thr Ile Asp Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile
1355 1360 1365

Glu Gly Ile Leu Ser Thr Leu Ser Ile Glu Asp Asn Lys Ile Ile
1370 1375 1380

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```
Leu Asn  His His Glu Ile Asn  Phe Ser Gly Asp Val  Asn Gly Ser
    1385                1390                1395

Asn Gly  Phe Ile Ser Leu Thr  Phe Ser Ile Leu Glu  Gly Ile Asn
    1400                1405                1410

Ala Ile  Ile Glu Val Asp Leu  Leu Ser Lys Ser Tyr  Lys Leu Leu
    1415                1420                1425

Ile Ser  Gly Glu Leu Lys Ile  Leu Met Leu Asn Ser  Asn His Ile
    1430                1435                1440

Gln Gln  Lys Ile Asp Tyr Ile  Gly Phe Asn Ser Glu  Leu Gln Lys
    1445                1450                1455

Asn Ile  Pro Tyr Ser Phe Val  Asp Ser Glu Gly Lys  Glu Asn Gly
    1460                1465                1470

Phe Ile  Asn Gly Ser Thr Lys  Glu Gly Leu Phe Val  Ser Glu Leu
    1475                1480                1485

Pro Asp  Val Val Leu Ile Ser  Lys Val Tyr Met Asp  Asp Ser Lys
    1490                1495                1500

Pro Ser  Phe Gly Tyr Tyr Ser  Asn Asn Leu Lys Asp  Val Lys Val
    1505                1510                1515

Ile Thr  Lys Asp Asn Val Asn  Ile Leu Thr Gly Tyr  Tyr Leu Lys
    1520                1525                1530

Asp Asp  Ile Lys Ile Ser Leu  Ser Phe Thr Leu Gln  Asp Glu Lys
    1535                1540                1545

Thr Ile  Lys Leu Asn Gly Val  His Leu Asp Glu Ser  Gly Val Ala
    1550                1555                1560

Glu Ile  Leu Lys Phe Met Asn  Lys Lys Gly Ser Thr  Asn Thr Ser
    1565                1570                1575
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Asp Ser  Leu Met Ser Phe Leu  Glu Ser Val Asn Ile  Lys Ser Ile
    1580                1585                1590

Phe Val  Asn Phe Leu Gln Ser  Lys Ile Asn Phe Ile  Leu Asp Ala
    1595                1600                1605

Asn Phe  Ile Ile Ser Gly Thr  Thr Ser Ile Gly Gln  Phe Glu Phe
    1610                1615                1620

Ile Cys  Asp Glu Asn Asp Asn  Ile Gln Pro Tyr Phe  Ile Lys Phe
    1625                1630                1635

Asn Thr  Leu Glu Thr Thr Tyr  Thr Leu Tyr Val Gly  Asn Arg Gln
    1640                1645                1650

Asn Met  Ile Val Glu Pro Asn  Tyr Asp Leu Asp Asp  Ser Gly Asp
    1655                1660                1665

Ile Ser  Ser Thr Val Ile Asn  Phe Ser Gln Lys Tyr  Leu Tyr Gly
    1670                1675                1680

Ile Asp  Ser Cys Val Asn Lys  Val Val Ile Ser Pro  Asn Ile Tyr
    1685                1690                1695

Thr Asp  Glu Ile Asn Ile Thr  Pro Val Tyr Glu Thr  Asn Asn Asn
    1700                1705                1710

Tyr Pro  Glu Val Ile Val Leu  Asp Ala Asn Tyr Ile  Asn Glu Lys
    1715                1720                1725

Ile Asn  Val Asn Ile Asn Asp  Leu Ser Ile Arg Tyr  Val Trp Ser
    1730                1735                1740

Asn Asp  Gly Asn Asp Phe Ile  Leu Met Ser Thr Ser  Glu Glu Asn
    1745                1750                1755

Lys Val  Ser Gln Val Lys Ile  Arg Phe Val Asn Val  Phe Lys Asp
    1760                1765                1770
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Lys Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln
1775 1780 1785

Asp Val Pro Val Ser Glu Ile Ile Ser Ala Phe Thr Pro Ser Tyr
1790 1795 1800

Tyr Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu
1805 1810 1815

Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser
1820 1825 1830

Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro
1835 1840 1845

Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys
1850 1855 1860

Tyr Tyr Phe Asn Pro Thr Asn Gly Gly Ala Ala Ser Ile Gly Glu
1865 1870 1875

Thr Ile Ile Asn Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Ile
1880 1885 1890

Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Leu Lys Tyr Phe
1895 1900 1905

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile
1910 1915 1920

Asp Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe
1925 1930 1935

Glu Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly
1940 1945 1950

Glu Met Tyr Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly
1955 1960 1965

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Leu Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly
1970 1975 1980

Ile Met Gln Lys Gly Phe Val Ser Ile Asn Asp Lys Lys Tyr Tyr
1985 1990 1995

Phe Asp Asp Ser Gly Val Met Lys Val Gly Tyr Ile Glu Ile Asp
2000 2005 2010

Gly Lys Tyr Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly
2015 2020 2025

Val Phe Asn Thr Ser Asp Gly Phe Lys Tyr Phe Ala His His Asn
2030 2035 2040

Glu Asp Leu Gly Asn Glu Glu Gly Glu Ala Ile Ser Tyr Ser Gly
2045 2050 2055

Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Tyr Ser Phe
2060 2065 2070

Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr
2075 2080 2085

Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Val Gly Leu Ser Leu
2090 2095 2100

Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln
2105 2110 2115

Val Gly Phe Val Thr Ile Asn Asn Lys Val Phe Tyr Phe Ser Asp
2120 2125 2130

Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
2135 2140 2145

Phe Tyr Ile Asp Glu Lys Gly Ile Val Gln Ile Gly Val Phe Asp
2150 2155 2160

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Thr Ser Asp Glu Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn
2165 2170 2175

Asp Asn Ile Tyr Gly Gln Ala Val Asp Tyr Ser Gly Leu Val Arg
2180 2185 2190

Val Gly Glu Asp Ile Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu
2195 2200 2205

Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile
2225 2230 2235

Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Asn Gly Ile Met Arg Thr
2240 2245 2250

Gly Leu Ile Ser Phe Glu Asn Asn Asp Tyr Tyr Phe Asn Glu Asn
2255 2260 2265

Gly Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe
2270 2275 2280

Tyr Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr
2285 2290 2295

Gln Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu
2300 2305 2310

Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu
2315 2320 2325

Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr
2330 2335 2340

Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp
2345 2350 2355

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Thr Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 175
<211> 2366
<212> PRT
<213> Clostridium difficile

<400> 175

Met Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg
1 5 10 15

Phe Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
20 25 30

Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
35 40 45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
50 55 60

Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65 70 75 80

Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys
85 90 95

Asn Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
100 105 110

Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
115 120 125

Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
130 135 140

Ile Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145 150 155 160

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```
Leu Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met
                165                 170                 175

Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala
            180                 185                 190

Gln Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile
        195                 200                 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr
    210                 215                 220

Ile Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val
225                 230                 235                 240

Arg Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu
                245                 250                 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu
            260                 265                 270

Arg Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp
        275                 280                 285

Met Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro
    290                 295                 300

Ser Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile
305                 310                 315                 320

Met Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp
                325                 330                 335

Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser
            340                 345                 350

Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala
        355                 360                 365
```

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```
Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn
    370                 375                 380

Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val
385                 390                 395                 400

Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro
                405                 410                 415

Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile
            420                 425                 430

Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met
        435                 440                 445

Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr
    450                 455                 460

Thr Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp
465                 470                 475                 480

Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala
                485                 490                 495

Asp Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr
            500                 505                 510

Glu Gln Glu Met Ala Ser Leu Trp Thr Phe Asp Asp Ala Arg Ala Lys
        515                 520                 525

Val Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly
    530                 535                 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu
545                 550                 555                 560

Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly
                565                 570                 575
```

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```
Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
            580                 585                 590

Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Ile Leu Phe
        595                 600                 605

Gln Lys Asn Ile Glu Asn Ser Glu Val Ala Tyr Tyr Tyr Asn Pro Gly
    610                 615                 620

Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Arg Ile Pro Ser Ile Ile
625                 630                 635                 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp
                645                 650                 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser
            660                 665                 670

Thr Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Ser
        675                 680                 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser
    690                 695                 700

Ile Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys
705                 710                 715                 720

Asp Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
                725                 730                 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Asn Glu Gly Arg Arg
            740                 745                 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
        755                 760                 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
    770                 775                 780
```

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```
Asn Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785                 790                 795                 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Leu Ser Asp Ile Glu Leu Glu
                805                 810                 815

Glu Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
            820                 825                 830

Asp Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr
        835                 840                 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser
    850                 855                 860

Ile Ser Asp Ser Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Asp Asp
865                 870                 875                 880

Ser His Phe Ile Ser Phe Glu Asp Ile Ser Lys Thr Glu Asp Gly Phe
                885                 890                 895

Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
            900                 905                 910

Thr Glu Lys Glu Ile Phe Ser Glu Tyr Ala Asn His Ile Arg Arg Glu
        915                 920                 925

Ile Ser Asn Ile Lys Asp Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
    930                 935                 940

Val Lys Lys Val Asn Leu Asp Ala Ile His Glu Val Asn Thr Leu Asn
945                 950                 955                 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Gly Tyr Ser Ser Ser Lys Glu
                965                 970                 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
            980                 985                 990
```

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```
Leu Phe Ser Thr Gly Leu Asn Thr  Ile Thr Asp Ala Ala  Lys Val Val
        995                 1000                1005

Glu Leu  Val Ser Thr Ala Leu  Asp Glu Thr Ile Asp  Leu Leu Pro
    1010                1015                1020

Thr Leu  Ser Glu Gly Leu Pro  Val Ile Ala Thr Ile  Ile Asp Gly
    1025                1030                1035

Val Ser  Leu Gly Ala Ala Ile  Lys Glu Leu Ser Glu  Thr Ser Asp
    1040                1045                1050

Pro Leu  Leu Arg Gln Glu Ile  Glu Ala Lys Ile Gly  Ile Met Ala
    1055                1060                1065

Val Asn  Leu Thr Ala Ala Thr  Thr Ala Ile Ile Thr  Ser Ser Leu
    1070                1075                1080

Gly Ile  Ala Ser Gly Phe Ser  Ile Leu Leu Val Pro  Leu Ala Gly
    1085                1090                1095

Ile Ser  Ala Gly Ile Pro Ser  Leu Val Asn Asn Glu  Leu Val Leu
    1100                1105                1110

Arg Asp  Lys Ala Thr Lys Val  Val Asp Tyr Phe Lys  His Ile Ser
    1115                1120                1125

Leu Val  Glu Thr Glu Gly Ala  Phe Thr Leu Leu Asp  Asp Lys Ile
    1130                1135                1140

Met Ile  Pro Gln Asp Asp Leu  Val Ile Ser Glu Ile  Asp Phe Asn
    1145                1150                1155

Asn Asn  Ser Ile Val Leu Gly  Lys Cys Glu Ile Trp  Arg Met Glu
    1160                1165                1170

Gly Gly  Ser Gly His Thr Val  Thr Asn Asp Ile Asp  His Phe Phe
    1175                1180                1185
```

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```
Ser Ser  Pro Thr Ile Thr Tyr  Ile Lys Pro His Leu  Ser Ile Tyr
    1190                1195                1200

Asp Val  Leu Glu Val Gln Lys  Glu Glu Leu Asp Leu  Ser Lys Asp
    1205                1210                1215

Leu Met  Val Leu Pro Asn Ala  Pro Asn Arg Val Phe  Ala Trp Glu
    1220                1225                1230

Thr Gly  Trp Thr Pro Gly Leu  Arg Ser Leu Glu Asn  Glu Gly Thr
    1235                1240                1245

Lys Leu  Leu Asp Arg Ile Arg  Asp His Tyr Lys Gly  Glu Phe Tyr
    1250                1255                1260

Trp Arg  Tyr Phe Ala Phe Ile  Ala Asp Ala Leu Ile  Thr Thr Leu
    1265                1270                1275

Lys Pro  Arg Tyr Glu Asp Thr  Asn Ile Arg Ile Asn  Leu Asp Ser
    1280                1285                1290

Asn Asn  Arg Ser Phe Ile Val  Pro Ile Ile Thr Thr  Glu His Ile
    1295                1300                1305

Arg Glu  Lys Leu Ser Tyr Ser  Phe His Gly Ser Gly  Gly Thr Tyr
    1310                1315                1320

Ala Leu  Ser Leu Ser Gln Tyr  Asn Met Gly Ile Asn  Ile Glu Leu
    1325                1330                1335

Ser Glu  Ser Asp Val Trp Ile  Ile Asp Val Asp Asn  Val Val Arg
    1340                1345                1350

Asp Val  Thr Ile Asp Ser Asp  Lys Ile Lys Lys Gly  Asp Leu Ile
    1355                1360                1365

Glu Gly  Ile Leu Ser Thr Leu  Ser Ile Glu Asp Asn  Lys Ile Ile
    1370                1375                1380
```

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```
Leu Asn  His His Glu Ile Asn  Phe Ser Gly Asp Val  Asn Gly Ser
    1385                1390                1395

Asn Gly  Phe Ile Ser Leu Thr  Phe Ser Ile Leu Glu  Gly Ile Asn
    1400                1405                1410

Ala Ile  Ile Glu Val Asp Leu  Leu Ser Lys Ser Tyr  Lys Leu Leu
    1415                1420                1425

Ile Ser  Gly Glu Leu Lys Ile  Leu Met Leu Asn Ser  Asn His Ile
    1430                1435                1440

Gln Gln  Lys Ile Asp Tyr Ile  Gly Phe Asn Ser Glu  Leu Gln Lys
    1445                1450                1455

Asn Ile  Pro Tyr Ser Phe Val  Asp Ser Glu Gly Lys  Glu Asn Gly
    1460                1465                1470

Phe Ile  Asn Gly Ser Thr Lys  Glu Gly Leu Phe Val  Ser Glu Leu
    1475                1480                1485

Pro Asp  Val Val Leu Ile Ser  Lys Val Tyr Met Asp  Asp Ser Lys
    1490                1495                1500

Pro Ser  Phe Gly Tyr Tyr Ser  Asn Asn Leu Lys Asp  Val Lys Val
    1505                1510                1515

Ile Thr  Lys Asp Asn Val Asn  Ile Leu Thr Gly Tyr  Tyr Leu Lys
    1520                1525                1530

Asp Asp  Ile Lys Ile Ser Leu  Ser Phe Thr Leu Gln  Asp Glu Lys
    1535                1540                1545

Thr Ile  Lys Leu Asn Gly Val  His Leu Asp Glu Ser  Gly Val Ala
    1550                1555                1560

Glu Ile  Leu Lys Phe Met Asn  Lys Lys Gly Ser Thr  Asn Thr Ser
    1565                1570                1575
```

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```
Asp Ser  Leu Met Ser Phe Leu  Glu Ser Val Asn Ile  Lys Ser Ile
    1580                1585                1590

Phe Val  Asn Phe Leu Gln Ser  Lys Ile Asn Phe Ile  Leu Asp Ala
    1595                1600                1605

Asn Phe  Ile Ile Ser Gly Thr  Thr Ser Ile Gly Gln  Phe Glu Phe
    1610                1615                1620

Ile Cys  Asp Glu Asn Asp Asn  Ile Gln Pro Tyr Phe  Ile Lys Phe
    1625                1630                1635

Asn Thr  Leu Glu Thr Thr Tyr  Thr Leu Tyr Val Gly  Asn Arg Gln
    1640                1645                1650

Asn Met  Ile Val Glu Pro Asn  Tyr Asp Leu Asp Asp  Ser Gly Asp
    1655                1660                1665

Ile Ser  Ser Thr Val Ile Asn  Phe Ser Gln Lys Tyr  Leu Tyr Gly
    1670                1675                1680

Ile Asp  Ser Cys Val Asn Lys  Val Val Ile Ser Pro  Asn Ile Tyr
    1685                1690                1695

Thr Asp  Glu Ile Asn Ile Thr  Pro Val Tyr Glu Thr  Asn Asn Asn
    1700                1705                1710

Tyr Pro  Glu Val Ile Val Leu  Asp Ala Asn Tyr Ile  Asn Glu Lys
    1715                1720                1725

Ile Asn  Val Asn Ile Asn Asp  Leu Ser Ile Arg Tyr  Val Trp Ser
    1730                1735                1740

Asn Asp  Gly Asn Asp Phe Ile  Leu Met Ser Thr Ser  Glu Glu Asn
    1745                1750                1755

Lys Val  Ser Gln Val Lys Ile  Arg Phe Val Asn Val  Phe Lys Asp
    1760                1765                1770
```

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Lys Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln
1775 1780 1785

Asp Val Pro Val Ser Glu Ile Ile Ser Ala Phe Thr Pro Ser Tyr
1790 1795 1800

Tyr Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu
1805 1810 1815

Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser
1820 1825 1830

Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro
1835 1840 1845

Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys
1850 1855 1860

Tyr Tyr Phe Asn Pro Thr Asn Gly Gly Ala Ala Ser Ile Gly Glu
1865 1870 1875

Thr Ile Ile Asn Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Ile
1880 1885 1890

Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Leu Lys Tyr Phe
1895 1900 1905

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile
1910 1915 1920

Asp Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe
1925 1930 1935

Glu Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly
1940 1945 1950

Glu Met Tyr Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly
1955 1960 1965

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```
Leu Asn  Gln Ile Gly Asp Asp  Lys Tyr Tyr Phe Asn  Ser Asp Gly
    1970                1975                1980

Ile Met  Gln Lys Gly Phe Val  Ser Ile Asn Asp Lys  Lys Tyr Tyr
    1985                1990                1995

Phe Asp  Asp Ser Gly Val Met  Lys Val Gly Tyr Ile  Glu Ile Asp
    2000                2005                2010

Gly Lys  Tyr Phe Tyr Phe Ala  Glu Asn Gly Glu Met  Gln Ile Gly
    2015                2020                2025

Val Phe  Asn Thr Ser Asp Gly  Phe Lys Tyr Phe Ala  His His Asn
    2030                2035                2040

Glu Asp  Leu Gly Asn Glu Glu  Gly Glu Ala Ile Ser  Tyr Ser Gly
    2045                2050                2055

Ile Leu  Asn Phe Asn Asn Lys  Ile Tyr Tyr Phe Asp  Tyr Ser Phe
    2060                2065                2070

Thr Ala  Val Val Gly Trp Lys  Asp Leu Glu Asp Gly  Ser Lys Tyr
    2075                2080                2085

Tyr Phe  Asp Glu Asp Thr Ala  Glu Ala Tyr Val Gly  Leu Ser Leu
    2090                2095                2100

Ile Asn  Asp Gly Gln Tyr Tyr  Phe Asn Asp Asp Gly  Ile Met Gln
    2105                2110                2115

Val Gly  Phe Val Thr Ile Asn  Asn Lys Val Phe Tyr  Phe Ser Asp
    2120                2125                2130

Ser Gly  Ile Ile Glu Ser Gly  Val Gln Asn Ile Asp  Asp Asn Tyr
    2135                2140                2145

Phe Tyr  Ile Asp Glu Lys Gly  Ile Val Gln Ile Gly  Val Phe Asp
    2150                2155                2160
```

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```
Thr Ser  Asp Glu Tyr Lys Tyr  Phe Ala Pro Ala Asn  Thr Val Asn
    2165                2170                2175

Asp Asn  Ile Tyr Gly Gln Ala  Val Asp Tyr Ser Gly  Leu Val Arg
    2180                2185                2190

Val Gly  Glu Asp Ile Tyr Tyr  Phe Gly Glu Thr Tyr  Thr Ile Glu
    2195                2200                2205

Thr Gly  Trp Ile Tyr Asp Met  Glu Asn Glu Ser Asp  Lys Tyr Tyr
    2210                2215                2220

Phe Asn  Pro Glu Thr Lys Lys  Ala Cys Lys Gly Ile  Asn Leu Ile
    2225                2230                2235

Asp Asp  Ile Lys Tyr Tyr Phe  Asp Glu Asn Gly Ile  Met Arg Thr
    2240                2245                2250

Gly Leu  Ile Ser Phe Glu Asn  Asn Asp Tyr Tyr Phe  Asn Glu Asn
    2255                2260                2265

Gly Glu  Met Gln Phe Gly Tyr  Ile Asn Ile Glu Asp  Lys Met Phe
    2270                2275                2280

Tyr Phe  Gly Glu Asp Gly Val  Met Gln Ile Gly Val  Phe Asn Thr
    2285                2290                2295

Gln Asp  Gly Phe Lys Tyr Phe  Ala His Gln Asn Thr  Leu Asp Glu
    2300                2305                2310

Asn Phe  Glu Gly Glu Ser Ile  Asn Tyr Thr Gly Trp  Leu Asp Leu
    2315                2320                2325

Asp Glu  Lys Arg Tyr Tyr Phe  Thr Asp Glu Tyr Ile  Ala Ala Thr
    2330                2335                2340

Gly Ser  Val Ile Ile Asp Gly  Glu Glu Tyr Tyr Phe  Asp Pro Asp
    2345                2350                2355
```

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Thr Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 176
<211> 2366
<212> PRT
<213> Clostridium difficile

<400> 176

Met Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg
1 5 10 15

Phe Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
20 25 30

Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
35 40 45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
50 55 60

Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65 70 75 80

Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys
85 90 95

Asn Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
100 105 110

Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
115 120 125

Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
130 135 140

Ile Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145 150 155 160

Leu Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met

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165 170 175

Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala
180 185 190

Gln Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile
195 200 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr
210 215 220

Ile Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val
225 230 235 240

Arg Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu
245 250 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu
260 265 270

Arg Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp
275 280 285

Met Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro
290 295 300

Ser Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile
305 310 315 320

Met Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp
325 330 335

Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser
340 345 350

Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala
355 360 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn

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```
    370                 375                 380

Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val
385                 390                 395                 400

Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro
                405                 410                 415

Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile
            420                 425                 430

Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met
        435                 440                 445

Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr
    450                 455                 460

Thr Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp
465                 470                 475                 480

Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala
                485                 490                 495

Asp Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr
            500                 505                 510

Glu Gln Glu Met Ala Ser Leu Trp Thr Phe Asp Asp Ala Arg Ala Lys
        515                 520                 525

Val Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly
    530                 535                 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu
545                 550                 555                 560

Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly
                565                 570                 575

Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
```

580 585 590

Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Ile Leu Phe
595 600 605

Gln Lys Asn Ile Glu Asn Ser Glu Val Ala Tyr Tyr Tyr Asn Pro Gly
610 615 620

Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Arg Ile Pro Ser Ile Ile
625 630 635 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp
645 650 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser
660 665 670

Thr Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Ser
675 680 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser
690 695 700

Ile Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys
705 710 715 720

Asp Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
725 730 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Asn Glu Gly Arg Arg
740 745 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
755 760 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
770 775 780

Asn Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu

785 790 795 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Leu Ser Asp Ile Glu Leu Glu
805 810 815

Glu Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
820 825 830

Asp Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr
835 840 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser
850 855 860

Ile Ser Asp Ser Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Asp Asp
865 870 875 880

Ser His Phe Ile Ser Phe Glu Asp Ile Ser Lys Thr Glu Asp Gly Phe
885 890 895

Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
900 905 910

Thr Glu Lys Glu Ile Phe Ser Glu Tyr Ala Asn His Ile Arg Arg Glu
915 920 925

Ile Ser Asn Ile Lys Asp Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
930 935 940

Val Lys Lys Val Asn Leu Asp Ala Ile His Glu Val Asn Thr Leu Asn
945 950 955 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Gly Tyr Ser Ser Ser Lys Glu
965 970 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
980 985 990

Leu Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp Ala Ala Lys Val Val

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995 1000 1005

Glu Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu Pro
1010 1015 1020

Thr Leu Ser Glu Gly Leu Pro Val Ile Ala Thr Ile Ile Asp Gly
1025 1030 1035

Val Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp
1040 1045 1050

Pro Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala
1055 1060 1065

Val Asn Leu Thr Ala Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu
1070 1075 1080

Gly Ile Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly
1085 1090 1095

Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu
1100 1105 1110

Arg Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Ile Ser
1115 1120 1125

Leu Val Glu Thr Glu Gly Ala Phe Thr Leu Leu Asp Asp Lys Ile
1130 1135 1140

Met Ile Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn
1145 1150 1155

Asn Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu
1160 1165 1170

Gly Gly Ser Gly His Thr Val Thr Asn Asp Ile Asp His Phe Phe
1175 1180 1185

Ser Ser Pro Thr Ile Thr Tyr Ile Lys Pro His Leu Ser Ile Tyr

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1190 1195 1200

Asp Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp
1205 1210 1215

Leu Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu
1220 1225 1230

Thr Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Glu Gly Thr
1235 1240 1245

Lys Leu Leu Asp Arg Ile Arg Asp His Tyr Lys Gly Glu Phe Tyr
1250 1255 1260

Trp Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu
1265 1270 1275

Lys Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser
1280 1285 1290

Asn Asn Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu His Ile
1295 1300 1305

Arg Glu Lys Leu Ser Tyr Ser Phe His Gly Ser Gly Gly Thr Tyr
1310 1315 1320

Ala Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu
1325 1330 1335

Ser Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg
1340 1345 1350

Asp Val Thr Ile Asp Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile
1355 1360 1365

Glu Gly Ile Leu Ser Thr Leu Ser Ile Glu Asp Asn Lys Ile Ile
1370 1375 1380

Leu Asn His His Glu Ile Asn Phe Ser Gly Asp Val Asn Gly Ser

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1385 1390 1395

Asn Gly Phe Ile Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn
1400 1405 1410

Ala Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu
1415 1420 1425

Ile Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile
1430 1435 1440

Gln Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys
1445 1450 1455

Asn Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly
1460 1465 1470

Phe Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu
1475 1480 1485

Pro Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys
1490 1495 1500

Pro Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val
1505 1510 1515

Ile Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys
1520 1525 1530

Asp Asp Ile Lys Ile Ser Leu Ser Phe Thr Leu Gln Asp Glu Lys
1535 1540 1545

Thr Ile Lys Leu Asn Gly Val His Leu Asp Glu Ser Gly Val Ala
1550 1555 1560

Glu Ile Leu Lys Phe Met Asn Lys Lys Gly Ser Thr Asn Thr Ser
1565 1570 1575

Asp Ser Leu Met Ser Phe Leu Glu Ser Val Asn Ile Lys Ser Ile

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1580 1585 1590

Phe Val Asn Phe Leu Gln Ser Lys Ile Asn Phe Ile Leu Asp Ala
1595 1600 1605

Asn Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe
1610 1615 1620

Ile Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe
1625 1630 1635

Asn Thr Leu Glu Thr Thr Tyr Thr Leu Tyr Val Gly Asn Arg Gln
1640 1645 1650

Asn Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp
1655 1660 1665

Ile Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly
1670 1675 1680

Ile Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr
1685 1690 1695

Thr Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Asn
1700 1705 1710

Tyr Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys
1715 1720 1725

Ile Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser
1730 1735 1740

Asn Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn
1745 1750 1755

Lys Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp
1760 1765 1770

Lys Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln

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1775 1780 1785

Asp Val Pro Val Ser Glu Ile Ile Ser Ala Phe Thr Pro Ser Tyr
1790 1795 1800

Tyr Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu
1805 1810 1815

Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser
1820 1825 1830

Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro
1835 1840 1845

Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys
1850 1855 1860

Tyr Tyr Phe Asn Pro Thr Asn Gly Gly Ala Ala Ser Ile Gly Glu
1865 1870 1875

Thr Ile Ile Asn Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Ile
1880 1885 1890

Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Leu Lys Tyr Phe
1895 1900 1905

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile
1910 1915 1920

Asp Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe
1925 1930 1935

Glu Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly
1940 1945 1950

Glu Met Tyr Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly
1955 1960 1965

Leu Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly

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1970 1975 1980

Ile Met Gln Lys Gly Phe Val Ser Ile Asn Asp Lys Lys Tyr Tyr
1985 1990 1995

Phe Asp Asp Ser Gly Val Met Lys Val Gly Tyr Ile Glu Ile Asp
2000 2005 2010

Gly Lys Tyr Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly
2015 2020 2025

Val Phe Asn Thr Ser Asp Gly Phe Lys Tyr Phe Ala His His Asn
2030 2035 2040

Glu Asp Leu Gly Asn Glu Glu Gly Glu Ala Ile Ser Tyr Ser Gly
2045 2050 2055

Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Tyr Ser Phe
2060 2065 2070

Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr
2075 2080 2085

Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Val Gly Leu Ser Leu
2090 2095 2100

Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln
2105 2110 2115

Val Gly Phe Val Thr Ile Asn Asn Lys Val Phe Tyr Phe Ser Asp
2120 2125 2130

Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
2135 2140 2145

Phe Tyr Ile Asp Glu Lys Gly Ile Val Gln Ile Gly Val Phe Asp
2150 2155 2160

Thr Ser Asp Glu Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn

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2165 2170 2175

Asp Asn Ile Tyr Gly Gln Ala Val Asp Tyr Ser Gly Leu Val Arg
2180 2185 2190

Val Gly Glu Asp Ile Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu
2195 2200 2205

Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile
2225 2230 2235

Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Asn Gly Ile Met Arg Thr
2240 2245 2250

Gly Leu Ile Ser Phe Glu Asn Asn Asp Tyr Tyr Phe Asn Glu Asn
2255 2260 2265

Gly Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe
2270 2275 2280

Tyr Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr
2285 2290 2295

Gln Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu
2300 2305 2310

Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu
2315 2320 2325

Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr
2330 2335 2340

Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp
2345 2350 2355

Thr Ala Gln Leu Val Ile Ser Glu

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2360 2365

<210> 177
<211> 2366
<212> PRT
<213> Clostridium difficile

<400> 177

Met Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg
1 5 10 15

Phe Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
20 25 30

Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
35 40 45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
50 55 60

Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65 70 75 80

Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys
85 90 95

Asn Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
100 105 110

Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
115 120 125

Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
130 135 140

Ile Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145 150 155 160

Leu Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met
165 170 175

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Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala
180 185 190

Gln Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile
195 200 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr
210 215 220

Ile Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val
225 230 235 240

Arg Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu
245 250 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu
260 265 270

Arg Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp
275 280 285

Met Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro
290 295 300

Ser Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile
305 310 315 320

Met Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp
325 330 335

Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser
340 345 350

Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala
355 360 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn
370 375 380

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Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val
385                 390                 395                 400

Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro
                405                 410                 415

Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile
            420                 425                 430

Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met
        435                 440                 445

Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr
    450                 455                 460

Thr Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp
465                 470                 475                 480

Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala
                485                 490                 495

Asp Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr
            500                 505                 510

Glu Gln Glu Met Ala Ser Leu Trp Thr Phe Asp Asp Ala Arg Ala Lys
        515                 520                 525

Val Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly
    530                 535                 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu
545                 550                 555                 560

Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly
                565                 570                 575

Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
            580                 585                 590
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Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Ile Leu Phe
        595                 600                 605

Gln Lys Asn Ile Glu Asn Ser Glu Val Ala Tyr Tyr Tyr Asn Pro Gly
    610                 615                 620

Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Arg Ile Pro Ser Ile Ile
625                 630                 635                 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp
                645                 650                 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser
            660                 665                 670

Thr Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Ser
        675                 680                 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser
    690                 695                 700

Ile Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys
705                 710                 715                 720

Asp Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
                725                 730                 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Asn Glu Gly Arg Arg
            740                 745                 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
        755                 760                 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
    770                 775                 780

Asn Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785                 790                 795                 800
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```
Leu Gln Glu Ile Arg Asn Asn Ser Asn Leu Ser Asp Ile Glu Leu Glu
                805                 810                 815

Glu Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
            820                 825                 830

Asp Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr
        835                 840                 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser
    850                 855                 860

Ile Ser Asp Ser Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Asp Asp
865                 870                 875                 880

Ser His Phe Ile Ser Phe Glu Asp Ile Ser Lys Thr Glu Asp Gly Phe
                885                 890                 895

Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
            900                 905                 910

Thr Glu Lys Glu Ile Phe Ser Glu Tyr Ala Asn His Ile Arg Arg Glu
        915                 920                 925

Ile Ser Asn Ile Lys Asp Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
    930                 935                 940

Val Lys Lys Val Asn Leu Asp Ala Ile His Glu Val Asn Thr Leu Asn
945                 950                 955                 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Gly Tyr Ser Ser Ser Lys Glu
                965                 970                 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
            980                 985                 990

Leu Phe Ser Thr Gly Leu Asn Thr  Ile Thr Asp Ala Ala  Lys Val Val
        995                 1000                1005
```

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```
Glu Leu  Val Ser Thr Ala Leu  Asp Glu Thr Ile Asp  Leu Leu Pro
    1010                1015                1020

Thr Leu  Ser Glu Gly Leu Pro  Val Ile Ala Thr Ile  Ile Asp Gly
    1025                1030                1035

Val Ser  Leu Gly Ala Ala Ile  Lys Glu Leu Ser Glu  Thr Ser Asp
    1040                1045                1050

Pro Leu  Leu Arg Gln Glu Ile  Glu Ala Lys Ile Gly  Ile Met Ala
    1055                1060                1065

Val Asn  Leu Thr Ala Ala Thr  Thr Ala Ile Ile Thr  Ser Ser Leu
    1070                1075                1080

Gly Ile  Ala Ser Gly Phe Ser  Ile Leu Leu Val Pro  Leu Ala Gly
    1085                1090                1095

Ile Ser  Ala Gly Ile Pro Ser  Leu Val Asn Asn Glu  Leu Val Leu
    1100                1105                1110

Arg Asp  Lys Ala Thr Lys Val  Val Asp Tyr Phe Lys  His Ile Ser
    1115                1120                1125

Leu Val  Glu Thr Glu Gly Ala  Phe Thr Leu Leu Asp  Asp Lys Ile
    1130                1135                1140

Met Ile  Pro Gln Asp Asp Leu  Val Ile Ser Glu Ile  Asp Phe Asn
    1145                1150                1155

Asn Asn  Ser Ile Val Leu Gly  Lys Cys Glu Ile Trp  Arg Met Glu
    1160                1165                1170

Gly Gly  Ser Gly His Thr Val  Thr Asn Asp Ile Asp  His Phe Phe
    1175                1180                1185

Ser Ser  Pro Thr Ile Thr Tyr  Ile Lys Pro His Leu  Ser Ile Tyr
    1190                1195                1200
```

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```
Asp Val  Leu Glu Val Gln Lys  Glu Glu Leu Asp Leu  Ser Lys Asp
    1205                 1210                 1215

Leu Met  Val Leu Pro Asn Ala  Pro Asn Arg Val Phe  Ala Trp Glu
    1220                 1225                 1230

Thr Gly  Trp Thr Pro Gly Leu  Arg Ser Leu Glu Asn  Glu Gly Thr
    1235                 1240                 1245

Lys Leu  Leu Asp Arg Ile Arg  Asp His Tyr Lys Gly  Glu Phe Tyr
    1250                 1255                 1260

Trp Arg  Tyr Phe Ala Phe Ile  Ala Asp Ala Leu Ile  Thr Thr Leu
    1265                 1270                 1275

Lys Pro  Arg Tyr Glu Asp Thr  Asn Ile Arg Ile Asn  Leu Asp Ser
    1280                 1285                 1290

Asn Asn  Arg Ser Phe Ile Val  Pro Ile Ile Thr Thr  Glu His Ile
    1295                 1300                 1305

Arg Glu  Lys Leu Ser Tyr Ser  Phe His Gly Ser Gly  Gly Thr Tyr
    1310                 1315                 1320

Ala Leu  Ser Leu Ser Gln Tyr  Asn Met Gly Ile Asn  Ile Glu Leu
    1325                 1330                 1335

Ser Glu  Ser Asp Val Trp Ile  Ile Asp Val Asp Asn  Val Val Arg
    1340                 1345                 1350

Asp Val  Thr Ile Asp Ser Asp  Lys Ile Lys Lys Gly  Asp Leu Ile
    1355                 1360                 1365

Glu Gly  Ile Leu Ser Thr Leu  Ser Ile Glu Asp Asn  Lys Ile Ile
    1370                 1375                 1380

Leu Asn  His His Glu Ile Asn  Phe Ser Gly Asp Val  Asn Gly Ser
    1385                 1390                 1395
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```
Asn Gly  Phe Ile Ser Leu Thr  Phe Ser Ile Leu Glu  Gly Ile Asn
    1400                1405                1410

Ala Ile  Ile Glu Val Asp Leu  Leu Ser Lys Ser Tyr  Lys Leu Leu
    1415                1420                1425

Ile Ser  Gly Glu Leu Lys Ile  Leu Met Leu Asn Ser  Asn His Ile
    1430                1435                1440

Gln Gln  Lys Ile Asp Tyr Ile  Gly Phe Asn Ser Glu  Leu Gln Lys
    1445                1450                1455

Asn Ile  Pro Tyr Ser Phe Val  Asp Ser Glu Gly Lys  Glu Asn Gly
    1460                1465                1470

Phe Ile  Asn Gly Ser Thr Lys  Glu Gly Leu Phe Val  Ser Glu Leu
    1475                1480                1485

Pro Asp  Val Val Leu Ile Ser  Lys Val Tyr Met Asp  Asp Ser Lys
    1490                1495                1500

Pro Ser  Phe Gly Tyr Tyr Ser  Asn Asn Leu Lys Asp  Val Lys Val
    1505                1510                1515

Ile Thr  Lys Asp Asn Val Asn  Ile Leu Thr Gly Tyr  Tyr Leu Lys
    1520                1525                1530

Asp Asp  Ile Lys Ile Ser Leu  Ser Phe Thr Leu Gln  Asp Glu Lys
    1535                1540                1545

Thr Ile  Lys Leu Asn Gly Val  His Leu Asp Glu Ser  Gly Val Ala
    1550                1555                1560

Glu Ile  Leu Lys Phe Met Asn  Lys Lys Gly Ser Thr  Asn Thr Ser
    1565                1570                1575

Asp Ser  Leu Met Ser Phe Leu  Glu Ser Val Asn Ile  Lys Ser Ile
    1580                1585                1590
```

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Phe Val Asn Phe Leu Gln Ser Lys Ile Asn Phe Ile Leu Asp Ala
1595 1600 1605

Asn Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe
1610 1615 1620

Ile Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe
1625 1630 1635

Asn Thr Leu Glu Thr Thr Tyr Thr Leu Tyr Val Gly Asn Arg Gln
1640 1645 1650

Asn Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp
1655 1660 1665

Ile Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly
1670 1675 1680

Ile Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr
1685 1690 1695

Thr Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Asn
1700 1705 1710

Tyr Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys
1715 1720 1725

Ile Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser
1730 1735 1740

Asn Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn
1745 1750 1755

Lys Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp
1760 1765 1770

Lys Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln
1775 1780 1785

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```
Asp Val  Pro Val Ser Glu Ile  Ile Ser Ala Phe Thr  Pro Ser Tyr
    1790                1795                1800

Tyr Glu  Asp Gly Leu Ile Gly  Tyr Asp Leu Gly Leu  Val Ser Leu
    1805                1810                1815

Tyr Asn  Glu Lys Phe Tyr Ile  Asn Asn Phe Gly Met  Met Val Ser
    1820                1825                1830

Gly Leu  Ile Tyr Ile Asn Asp  Ser Leu Tyr Tyr Phe  Lys Pro Pro
    1835                1840                1845

Val Asn  Asn Leu Ile Thr Gly  Phe Val Thr Val Gly  Asp Asp Lys
    1850                1855                1860

Tyr Tyr  Phe Asn Pro Thr Asn  Gly Gly Ala Ala Ser  Ile Gly Glu
    1865                1870                1875

Thr Ile  Ile Asn Asp Lys Asn  Tyr Tyr Phe Asn Gln  Ser Gly Ile
    1880                1885                1890

Leu Gln  Thr Gly Val Phe Ser  Thr Glu Asp Gly Leu  Lys Tyr Phe
    1895                1900                1905

Ala Pro  Ala Asn Thr Leu Asp  Glu Asn Leu Glu Gly  Glu Ala Ile
    1910                1915                1920

Asp Phe  Thr Gly Lys Leu Ile  Ile Asp Glu Asn Ile  Tyr Tyr Phe
    1925                1930                1935

Glu Asp  Asn Tyr Arg Gly Ala  Val Glu Trp Lys Glu  Leu Asp Gly
    1940                1945                1950

Glu Met  Tyr Tyr Phe Ser Pro  Glu Thr Gly Lys Ala  Phe Lys Gly
    1955                1960                1965

Leu Asn  Gln Ile Gly Asp Asp  Lys Tyr Tyr Phe Asn  Ser Asp Gly
    1970                1975                1980
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Ile Met Gln Lys Gly Phe Val Ser Ile Asn Asp Lys Lys Tyr Tyr
1985 1990 1995

Phe Asp Asp Ser Gly Val Met Lys Val Gly Tyr Ile Glu Ile Asp
2000 2005 2010

Gly Lys Tyr Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly
2015 2020 2025

Val Phe Asn Thr Ser Asp Gly Phe Lys Tyr Phe Ala His His Asn
2030 2035 2040

Glu Asp Leu Gly Asn Glu Glu Gly Glu Ala Ile Ser Tyr Ser Gly
2045 2050 2055

Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Tyr Ser Phe
2060 2065 2070

Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr
2075 2080 2085

Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Val Gly Leu Ser Leu
2090 2095 2100

Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln
2105 2110 2115

Val Gly Phe Val Thr Ile Asn Asn Lys Val Phe Tyr Phe Ser Asp
2120 2125 2130

Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
2135 2140 2145

Phe Tyr Ile Asp Glu Lys Gly Ile Val Gln Ile Gly Val Phe Asp
2150 2155 2160

Thr Ser Asp Glu Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn
2165 2170 2175

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Asp Asn Ile Tyr Gly Gln Ala Val Asp Tyr Ser Gly Leu Val Arg
2180 2185 2190

Val Gly Glu Asp Ile Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu
2195 2200 2205

Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile
2225 2230 2235

Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Asn Gly Ile Met Arg Thr
2240 2245 2250

Gly Leu Ile Ser Phe Glu Asn Asn Asp Tyr Tyr Phe Asn Glu Asn
2255 2260 2265

Gly Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe
2270 2275 2280

Tyr Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr
2285 2290 2295

Gln Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu
2300 2305 2310

Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu
2315 2320 2325

Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr
2330 2335 2340

Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp
2345 2350 2355

Thr Ala Gln Leu Val Ile Ser Glu
2360 2365

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<210> 178
<211> 2710
<212> PRT
<213> Clostridium difficile

<400> 178

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Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1               5                  10                  15

Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
            20                  25                  30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
        35                  40                  45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr
    50                  55                  60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65                  70                  75                  80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
            100                 105                 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
        115                 120                 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
    130                 135                 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175
```

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```
Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
    290                 295                 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
                325                 330                 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
            340                 345                 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
        355                 360                 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
    370                 375                 380
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```
Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385                 390                 395                 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
                405                 410                 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
            420                 425                 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
        435                 440                 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
    450                 455                 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465                 470                 475                 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
                485                 490                 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
            500                 505                 510

Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
        515                 520                 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
    530                 535                 540

Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545                 550                 555                 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
                565                 570                 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
            580                 585                 590
```

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```
Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
        595                 600                 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
    610                 615                 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625                 630                 635                 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
                645                 650                 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
            660                 665                 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
        675                 680                 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
    690                 695                 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705                 710                 715                 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser
                725                 730                 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
            740                 745                 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
        755                 760                 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
    770                 775                 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785                 790                 795                 800
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```
Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
                805                 810                 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
            820                 825                 830

Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
        835                 840                 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
    850                 855                 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865                 870                 875                 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
                885                 890                 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
            900                 905                 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
        915                 920                 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
    930                 935                 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945                 950                 955                 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
                965                 970                 975

Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
            980                 985                 990

Ala Gln Leu Phe Ser Thr Gly Leu  Asn Thr Ile Tyr Asp  Ser Ile Gln
        995                 1000                1005
```

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Leu Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val
1010 1015 1020

Leu Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu
1025 1030 1035

Asp Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu
1040 1045 1050

His Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val
1055 1060 1065

Leu Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser
1070 1075 1080

Ile Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile
1085 1090 1095

Ala Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu
1100 1105 1110

Ile Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His
1115 1120 1125

Leu Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp
1130 1135 1140

Lys Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp
1145 1150 1155

Phe Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala
1160 1165 1170

Met Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His
1175 1180 1185

Phe Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser
1190 1195 1200

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Ile Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser
1205 1210 1215

Lys Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp
1220 1225 1230

Trp Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp
1235 1240 1245

Gly Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys
1250 1255 1260

Phe Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr
1265 1270 1275

Leu Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp
1280 1285 1290

Lys Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu
1295 1300 1305

Ile Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr
1310 1315 1320

Tyr Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn
1325 1330 1335

Leu Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val
1340 1345 1350

Arg Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu
1355 1360 1365

Ile Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu
1370 1375 1380

Ile Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn
1385 1390 1395

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Lys Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile
1400 1405 1410

Ser Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu
1415 1420 1425

Leu Leu Ser Gly Asn Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn
1430 1435 1440

Thr Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile
1445 1450 1455

Ala Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala
1460 1465 1470

Ile Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp
1475 1480 1485

Ser Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe
1490 1495 1500

Asn Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys
1505 1510 1515

Asp Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn
1520 1525 1530

Thr Asp Lys Gly Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn
1535 1540 1545

Gln Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser
1550 1555 1560

Ser Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr
1565 1570 1575

Ser Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys
1580 1585 1590

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Leu Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe
1595 1600 1605

Thr Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys
1610 1615 1620

Asp Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr
1625 1630 1635

Ser Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val
1640 1645 1650

Val Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser
1655 1660 1665

Thr Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg
1670 1675 1680

Tyr Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu
1685 1690 1695

Ile Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu
1700 1705 1710

Ile Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile
1715 1720 1725

Asn Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly
1730 1735 1740

Ser Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys
1745 1750 1755

Ile Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln
1760 1765 1770

Ser Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu
1775 1780 1785

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Ser Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu
1790 1795 1800

Asn Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn
1805 1810 1815

Lys Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu
1820 1825 1830

Ile Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe
1835 1840 1845

Asn Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr
1850 1855 1860

Phe Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile
1865 1870 1875

Asn Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu
1880 1885 1890

Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala
1895 1900 1905

Asn Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln
1910 1915 1920

Ser Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn
1925 1930 1935

Asp Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys
1940 1945 1950

Tyr Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln
1955 1960 1965

Val Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile
1970 1975 1980

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Ile Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe
1985 1990 1995

Asp Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp
2000 2005 2010

Gly Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly
2015 2020 2025

Val Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2030 2035 2040

Thr Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
2045 2050 2055

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
2060 2065 2070

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr
2075 2080 2085

Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr
2090 2095 2100

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala
2105 2110 2115

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2120 2125 2130

Thr Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
2135 2140 2145

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2150 2155 2160

Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2165 2170 2175

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Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu
2180 2185 2190

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser
2195 2200 2205

Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile
2225 2230 2235

Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn
2240 2245 2250

Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn
2255 2260 2265

Asn Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly
2270 2275 2280

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu
2285 2290 2295

Gly Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly
2300 2305 2310

Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp
2315 2320 2325

Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala
2330 2335 2340

Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr
2345 2350 2355

Phe Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2360 2365 2370

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```
Asp Gly  Lys Lys Tyr Tyr Phe  Asn Thr Asn Thr Phe  Ile Ala Ser
    2375                2380                2385

Thr Gly  Tyr Thr Ser Ile Asn  Gly Lys His Phe Tyr  Phe Asn Thr
    2390                2395                2400

Asp Gly  Ile Met Gln Ile Gly  Val Phe Lys Gly Pro  Asn Gly Phe
    2405                2410                2415

Glu Tyr  Phe Ala Pro Ala Asn  Thr His Asn Asn Asn  Ile Glu Gly
    2420                2425                2430

Gln Ala  Ile Leu Tyr Gln Asn  Lys Phe Leu Thr Leu  Asn Gly Lys
    2435                2440                2445

Lys Tyr  Tyr Phe Gly Ser Asp  Ser Lys Ala Val Thr  Gly Leu Arg
    2450                2455                2460

Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn Thr Asn  Thr Ala Val
    2465                2470                2475

Ala Val  Thr Gly Trp Gln Thr  Ile Asn Gly Lys Lys  Tyr Tyr Phe
    2480                2485                2490

Asn Thr  Asn Thr Ser Ile Ala  Ser Thr Gly Tyr Thr  Ile Ile Ser
    2495                2500                2505

Gly Lys  His Phe Tyr Phe Asn  Thr Asp Gly Ile Met  Gln Ile Gly
    2510                2515                2520

Val Phe  Lys Gly Pro Asp Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2525                2530                2535

Thr Asp  Ala Asn Asn Ile Glu  Gly Gln Ala Ile Arg  Tyr Gln Asn
    2540                2545                2550

Arg Phe  Leu Tyr Leu His Asp  Asn Ile Tyr Tyr Phe  Gly Asn Asn
    2555                2560                2565
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Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr
2570 2575 2580

Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr
2585 2590 2595

Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile
2600 2605 2610

Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala
2615 2620 2625

Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln
2630 2635 2640

Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly
2705 2710

<210> 179
<211> 2366
<212> PRT
<213> Clostridium difficile

<400> 179

Met Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg
1 5 10 15

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Phe Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
            20                  25                  30

Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
        35                  40                  45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
    50                  55                  60

Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65                  70                  75                  80

Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys
                85                  90                  95

Asn Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
            100                 105                 110

Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
        115                 120                 125

Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
    130                 135                 140

Val Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145                 150                 155                 160

Leu Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met
                165                 170                 175

Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala
            180                 185                 190

Gln Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr
        195                 200                 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr
    210                 215                 220
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```
Ile Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val
225                 230                 235                 240

Arg Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu
                245                 250                 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu
            260                 265                 270

Arg Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp
        275                 280                 285

Met Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro
    290                 295                 300

Ser Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile
305                 310                 315                 320

Met Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp
                325                 330                 335

Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
            340                 345                 350

Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala
        355                 360                 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn
    370                 375                 380

Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val
385                 390                 395                 400

Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro
                405                 410                 415

Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile
            420                 425                 430
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```
Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met
        435                 440                 445

Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr
    450                 455                 460

Thr Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp
465                 470                 475                 480

Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala
                485                 490                 495

Asp Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr
            500                 505                 510

Glu Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys
        515                 520                 525

Ala Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly
    530                 535                 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu
545                 550                 555                 560

Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly
                565                 570                 575

Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
            580                 585                 590

Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe
        595                 600                 605

Gln Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly
    610                 615                 620

Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile
625                 630                 635                 640
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Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp
                645                 650                 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser
            660                 665                 670

Thr Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro
        675                 680                 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser
    690                 695                 700

Ile Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys
705                 710                 715                 720

Asp Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
                725                 730                 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg
            740                 745                 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
        755                 760                 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
    770                 775                 780

Asn Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785                 790                 795                 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu
                805                 810                 815

Glu Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
            820                 825                 830

Asp Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr
        835                 840                 845
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Ser Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser
    850                 855                 860

Ile Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp
865                 870                 875                 880

Ser His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Glu Glu Gly Phe
                885                 890                 895

Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
            900                 905                 910

Thr Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu
        915                 920                 925

Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
    930                 935                 940

Val Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn
945                 950                 955                 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu
                965                 970                 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
            980                 985                 990

Leu Phe Ser Thr Gly Leu Asn Thr  Ile Thr Asp Ala Ala  Lys Val Val
        995                 1000                1005

Glu Leu  Val Ser Thr Ala Leu  Asp Glu Thr Ile Asp  Leu Leu Pro
    1010                1015                1020

Thr Leu  Ser Glu Gly Leu Pro  Ile Ile Ala Thr Ile  Ile Asp Gly
    1025                1030                1035

Val Ser  Leu Gly Ala Ala Ile  Lys Glu Leu Ser Glu  Thr Ser Asp
    1040                1045                1050
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Pro Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala
1055 1060 1065

Val Asn Leu Thr Thr Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu
1070 1075 1080

Gly Ile Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly
1085 1090 1095

Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu
1100 1105 1110

Arg Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Val Ser
1115 1120 1125

Leu Val Glu Thr Glu Gly Val Phe Thr Leu Leu Asp Asp Lys Ile
1130 1135 1140

Met Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn
1145 1150 1155

Asn Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu
1160 1165 1170

Gly Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe
1175 1180 1185

Ser Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr
1190 1195 1200

Asp Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp
1205 1210 1215

Leu Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu
1220 1225 1230

Thr Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr
1235 1240 1245

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Lys Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr
1250 1255 1260

Trp Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu
1265 1270 1275

Lys Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser
1280 1285 1290

Asn Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile
1295 1300 1305

Arg Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr
1310 1315 1320

Ala Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu
1325 1330 1335

Ser Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg
1340 1345 1350

Asp Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile
1355 1360 1365

Glu Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile
1370 1375 1380

Leu Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser
1385 1390 1395

Asn Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn
1400 1405 1410

Ala Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu
1415 1420 1425

Ile Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile
1430 1435 1440

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```
Gln Gln  Lys Ile Asp Tyr Ile  Gly Phe Asn Ser Glu  Leu Gln Lys
    1445                1450                1455

Asn Ile  Pro Tyr Ser Phe Val  Asp Ser Glu Gly Lys  Glu Asn Gly
    1460                1465                1470

Phe Ile  Asn Gly Ser Thr Lys  Glu Gly Leu Phe Val  Ser Glu Leu
    1475                1480                1485

Pro Asp  Val Val Leu Ile Ser  Lys Val Tyr Met Asp  Asp Ser Lys
    1490                1495                1500

Pro Ser  Phe Gly Tyr Tyr Ser  Asn Asn Leu Lys Asp  Val Lys Val
    1505                1510                1515

Ile Thr  Lys Asp Asn Val Asn  Ile Leu Thr Gly Tyr  Tyr Leu Lys
    1520                1525                1530

Asp Asp  Ile Lys Ile Ser Leu  Ser Leu Thr Leu Gln  Asp Glu Lys
    1535                1540                1545

Thr Ile  Lys Leu Asn Ser Val  His Leu Asp Glu Ser  Gly Val Ala
    1550                1555                1560

Glu Ile  Leu Lys Phe Met Asn  Arg Lys Gly Asn Thr  Asn Thr Ser
    1565                1570                1575

Asp Ser  Leu Met Ser Phe Leu  Glu Ser Met Asn Ile  Lys Ser Ile
    1580                1585                1590

Phe Val  Asn Phe Leu Gln Ser  Asn Ile Lys Phe Ile  Leu Asp Ala
    1595                1600                1605

Asn Phe  Ile Ile Ser Gly Thr  Thr Ser Ile Gly Gln  Phe Glu Phe
    1610                1615                1620

Ile Cys  Asp Glu Asn Asp Asn  Ile Gln Pro Tyr Phe  Ile Lys Phe
    1625                1630                1635
```

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Asn Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln
1640 1645 1650

Asn Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp
1655 1660 1665

Ile Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly
1670 1675 1680

Ile Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr
1685 1690 1695

Thr Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr
1700 1705 1710

Tyr Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys
1715 1720 1725

Ile Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser
1730 1735 1740

Asn Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn
1745 1750 1755

Lys Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp
1760 1765 1770

Lys Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln
1775 1780 1785

Asp Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr
1790 1795 1800

Tyr Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu
1805 1810 1815

Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser
1820 1825 1830

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```
Gly Leu  Ile Tyr Ile Asn Asp  Ser Leu Tyr Tyr Phe  Lys Pro Pro
    1835                1840                1845

Val Asn  Asn Leu Ile Thr Gly  Phe Val Thr Val Gly  Asp Asp Lys
    1850                1855                1860

Tyr Tyr  Phe Asn Pro Ile Asn  Gly Gly Ala Ala Ser  Ile Gly Glu
    1865                1870                1875

Thr Ile  Ile Asp Asp Lys Asn  Tyr Tyr Phe Asn Gln  Ser Gly Val
    1880                1885                1890

Leu Gln  Thr Gly Val Phe Ser  Thr Glu Asp Gly Phe  Lys Tyr Phe
    1895                1900                1905

Ala Pro  Ala Asn Thr Leu Asp  Glu Asn Leu Glu Gly  Glu Ala Ile
    1910                1915                1920

Asp Phe  Thr Gly Lys Leu Ile  Ile Asp Glu Asn Ile  Tyr Tyr Phe
    1925                1930                1935

Glu Asp  Asn Tyr Arg Gly Ala  Val Glu Trp Lys Glu  Leu Asp Gly
    1940                1945                1950

Glu Met  His Tyr Phe Ser Pro  Glu Thr Gly Lys Ala  Phe Lys Gly
    1955                1960                1965

Leu Asn  Gln Ile Gly Asp Asp  Lys Tyr Tyr Phe Asn  Ser Asp Gly
    1970                1975                1980

Val Met  Gln Lys Gly Phe Val  Ser Ile Asn Asp Asn  Lys His Tyr
    1985                1990                1995

Phe Asp  Asp Ser Gly Val Met  Lys Val Gly Tyr Thr  Glu Ile Asp
    2000                2005                2010

Gly Lys  Tyr Phe Tyr Phe Ala  Glu Asn Gly Glu Met  Gln Ile Gly
    2015                2020                2025
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Val Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn
2030 2035 2040

Glu Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly
2045 2050 2055

Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe
2060 2065 2070

Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr
2075 2080 2085

Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu
2090 2095 2100

Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln
2105 2110 2115

Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp
2120 2125 2130

Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
2135 2140 2145

Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp
2150 2155 2160

Thr Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn
2165 2170 2175

Asp Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg
2180 2185 2190

Val Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu
2195 2200 2205

Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr
2210 2215 2220

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Phe Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile
2225 2230 2235

Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr
2240 2245 2250

Gly Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn
2255 2260 2265

Gly Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe
2270 2275 2280

Tyr Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr
2285 2290 2295

Pro Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu
2300 2305 2310

Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu
2315 2320 2325

Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr
2330 2335 2340

Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp
2345 2350 2355

Thr Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 180
<211> 2710
<212> PRT
<213> Clostridium difficile

<400> 180

Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1 5 10 15

Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu

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20 25 30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
35 40 45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn
50 55 60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65 70 75 80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
100 105 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
115 120 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
130 135 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145 150 155 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
165 170 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Val Asn Tyr Tyr Lys Ser Gln
180 185 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
195 200 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg
210 215 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg

225 230 235 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
245 250 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
260 265 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
275 280 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
290 295 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
325 330 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
340 345 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
355 360 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
370 375 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385 390 395 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
405 410 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
420 425 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys

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435 440 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
450 455 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465 470 475 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
485 490 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
500 505 510

Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
515 520 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
530 535 540

Asp Asn Glu Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545 550 555 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
565 570 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
580 585 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
595 600 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
610 615 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625 630 635 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly

645 650 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
660 665 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
675 680 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
690 695 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705 710 715 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser
725 730 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
740 745 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
755 760 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
770 775 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785 790 795 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Thr Ser Val Ser
805 810 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
820 825 830

Ser Val Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
835 840 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu

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    850                 855                 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865                 870                 875                 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
                885                 890                 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
            900                 905                 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
        915                 920                 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
    930                 935                 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945                 950                 955                 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
                965                 970                 975

Lys Asp Leu Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
            980                 985                 990

Ala Gln Leu Phe Ser Thr Gly Leu  Asn Thr Ile Tyr Asp  Ser Ile Gln
        995                 1000                1005

Leu Val  Asn Leu Ile Ser Asn  Ala Val Asn Asp Thr  Ile Asn Val
    1010                1015                1020

Leu Pro  Thr Ile Thr Glu Gly  Ile Pro Ile Val Ser  Thr Ile Leu
    1025                1030                1035

Asp Gly  Ile Asn Leu Gly Ala  Ala Ile Lys Glu Leu  Leu Asp Glu
    1040                1045                1050

His Asp  Pro Leu Leu Lys Lys  Glu Leu Glu Ala Lys  Val Gly Val
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    1055                1060                1065

Leu Ala  Ile Asn Met Ser Leu  Ser Ile Ala Ala Thr  Val Ala Ser
    1070                1075                1080

Ile Val  Gly Ile Gly Ala Glu  Val Thr Ile Phe Leu  Leu Pro Ile
    1085                1090                1095

Ala Gly  Ile Ser Ala Gly Ile  Pro Ser Leu Val Asn  Asn Glu Leu
    1100                1105                1110

Ile Leu  His Asp Lys Ala Thr  Ser Val Val Asn Tyr  Phe Asn His
    1115                1120                1125

Leu Ser  Glu Ser Lys Glu Tyr  Gly Pro Leu Lys Thr  Glu Asp Asp
    1130                1135                1140

Lys Ile  Leu Val Pro Ile Asp  Asp Leu Val Ile Ser  Glu Ile Asp
    1145                1150                1155

Phe Asn  Asn Asn Ala Ile Lys  Leu Gly Thr Cys Asn  Ile Leu Ala
    1160                1165                1170

Met Glu  Gly Gly Ser Gly His  Thr Val Thr Gly Asn  Ile Asp His
    1175                1180                1185

Phe Phe  Ser Ser Pro Ser Ile  Ser Ser His Ile Pro  Ser Leu Ser
    1190                1195                1200

Ile Tyr  Ser Ala Ile Gly Ile  Lys Thr Glu Asn Leu  Asp Phe Ser
    1205                1210                1215

Lys Lys  Ile Met Met Leu Pro  Asn Ala Pro Ser Arg  Val Phe Trp
    1220                1225                1230

Trp Glu  Thr Gly Ala Val Pro  Gly Leu Arg Ser Leu  Glu Asn Asn
    1235                1240                1245

Gly Thr  Lys Leu Leu Asp Ser  Ile Arg Asp Leu Tyr  Pro Gly Lys
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1250 1255 1260

Phe Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr
1265 1270 1275

Leu Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp
1280 1285 1290

Lys Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu
1295 1300 1305

Ile Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr
1310 1315 1320

Tyr Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn
1325 1330 1335

Leu Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val
1340 1345 1350

Arg Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu
1355 1360 1365

Ile Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu
1370 1375 1380

Ile Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn
1385 1390 1395

Lys Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile
1400 1405 1410

Ser Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu
1415 1420 1425

Leu Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn
1430 1435 1440

Thr Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile

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1445 1450 1455

Ala Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala
1460 1465 1470

Ile Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp
1475 1480 1485

Ser Lys Asn Ile Leu Glu Phe Tyr Asn Gly Ser Thr Leu Glu Phe
1490 1495 1500

Asn Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys
1505 1510 1515

Asp Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn
1520 1525 1530

Thr Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn
1535 1540 1545

Gln Ala Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser
1550 1555 1560

Ser Tyr Leu Asp Phe Val Lys Asn Ala Asp Gly His His Asn Thr
1565 1570 1575

Ser Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys
1580 1585 1590

Leu Phe Gly Phe Glu Asn Ile Asn Phe Val Val Asp Lys Tyr Phe
1595 1600 1605

Thr Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys
1610 1615 1620

Asp Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr
1625 1630 1635

Ser Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val

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1640 1645 1650

Val Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser
1655 1660 1665

Thr Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg
1670 1675 1680

Tyr Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu
1685 1690 1695

Ile Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu
1700 1705 1710

Ile Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile
1715 1720 1725

Asn Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly
1730 1735 1740

Ser Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys
1745 1750 1755

Ile Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln
1760 1765 1770

Ser Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu
1775 1780 1785

Ser Leu Val Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu
1790 1795 1800

Asn Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn
1805 1810 1815

Lys Thr Tyr Tyr Tyr Asp Glu Ala Ser Lys Leu Val Lys Gly Leu
1820 1825 1830

Ile Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Ser

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1835 1840 1845

Asn Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr
1850 1855 1860

Phe Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile
1865 1870 1875

Asn Gly Lys His Phe Tyr Phe Asn Asn Asn Gly Val Met Gln Leu
1880 1885 1890

Gly Val Phe Lys Gly Pro Asp Arg Phe Glu Tyr Phe Ala Pro Ala
1895 1900 1905

Asn Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln
1910 1915 1920

Ser Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn
1925 1930 1935

Asp Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys
1940 1945 1950

Tyr Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln
1955 1960 1965

Val Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile
1970 1975 1980

Ile Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe
1985 1990 1995

Asp Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp
2000 2005 2010

Gly Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly
2015 2020 2025

Val Phe Ser Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn

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2030 2035 2040

Thr Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
2045 2050 2055

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
2060 2065 2070

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr
2075 2080 2085

Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr
2090 2095 2100

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Val
2105 2110 2115

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2120 2125 2130

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
2135 2140 2145

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2150 2155 2160

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2165 2170 2175

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Lys
2180 2185 2190

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Ala Ser Asp Ser
2195 2200 2205

Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Asn Asn Ala Ile Ala Ala Thr His Leu Tyr Thr Ile

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2225 2230 2235

Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn
2240 2245 2250

Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn
2255 2260 2265

Asn Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly
2270 2275 2280

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu
2285 2290 2295

Gly Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly
2300 2305 2310

Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp
2315 2320 2325

Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala
2330 2335 2340

Val Ala Val Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr
2345 2350 2355

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2360 2365 2370

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ser Ile Ala Ser
2375 2380 2385

Thr Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr Phe Asn Thr
2390 2395 2400

Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly Phe
2405 2410 2415

Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly

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2420 2425 2430

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2435 2440 2445

Lys Tyr Tyr Phe Ala Ser Asp Ser Lys Ala Val Thr Gly Leu Arg
2450 2455 2460

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu
2465 2470 2475

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2480 2485 2490

Asn Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn
2495 2500 2505

Asp Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly
2510 2515 2520

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2525 2530 2535

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2540 2545 2550

Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn
2555 2560 2565

Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Arg Arg Tyr
2570 2575 2580

Tyr Phe Glu Pro Asn Thr Ala Ile Gly Ala Asn Gly Tyr Lys Ile
2585 2590 2595

Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile
2600 2605 2610

Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala

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2615 2620 2625

Asn Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg Tyr Gln
2630 2635 2640

Asn Arg Phe Leu His Leu Leu Gly Asn Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Asn Met
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly
2705 2710

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<211> 2366
<212> PRT
<213> Clostridium difficile

<400> 181

Met Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg
1 5 10 15

Phe Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
20 25 30

Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
35 40 45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
50 55 60

Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65 70 75 80

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```
Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys
                85                  90                  95

Asn Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
            100                 105                 110

Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
        115                 120                 125

Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
    130                 135                 140

Ile Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145                 150                 155                 160

Leu Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met
                165                 170                 175

Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala
            180                 185                 190

Gln Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile
        195                 200                 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr
    210                 215                 220

Ile Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val
225                 230                 235                 240

Arg Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu
                245                 250                 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu
            260                 265                 270

Arg Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp
        275                 280                 285
```

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```
Met Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro
    290                 295                 300

Ser Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile
305                 310                 315                 320

Met Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp
                325                 330                 335

Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser
            340                 345                 350

Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala
        355                 360                 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn
    370                 375                 380

Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val
385                 390                 395                 400

Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro
                405                 410                 415

Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile
            420                 425                 430

Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met
        435                 440                 445

Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr
    450                 455                 460

Thr Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp
465                 470                 475                 480

Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala
                485                 490                 495
```

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```
Asp Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr
            500                 505                 510

Glu Gln Glu Met Ala Ser Leu Trp Thr Phe Asp Asp Ala Arg Ala Lys
        515                 520                 525

Val Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly
    530                 535                 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu
545                 550                 555                 560

Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly
                565                 570                 575

Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
            580                 585                 590

Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Ile Leu Phe
        595                 600                 605

Gln Lys Asn Ile Glu Asn Ser Glu Val Ala Tyr Tyr Tyr Asn Pro Gly
    610                 615                 620

Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Arg Ile Pro Ser Ile Ile
625                 630                 635                 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp
                645                 650                 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser
            660                 665                 670

Thr Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Ser
        675                 680                 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser
    690                 695                 700
```

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```
Ile Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys
705                 710                 715                 720

Asp Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
                725                 730                 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Asn Glu Gly Arg Arg
            740                 745                 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
        755                 760                 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
    770                 775                 780

Asn Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785                 790                 795                 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Leu Ser Asp Ile Glu Leu Glu
                805                 810                 815

Glu Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
            820                 825                 830

Asp Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr
        835                 840                 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser
    850                 855                 860

Ile Ser Asp Ser Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Asp Asp
865                 870                 875                 880

Ser His Phe Ile Ser Phe Glu Asp Ile Ser Lys Thr Glu Asp Gly Phe
                885                 890                 895

Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
            900                 905                 910
```

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```
Thr Glu Lys Glu Ile Phe Ser Glu Tyr Ala Asn His Ile Glu Arg Glu
        915                 920                 925

Ile Ser Asn Ile Lys Asp Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
    930                 935                 940

Val Lys Lys Val Asn Leu Asp Ala Ile His Glu Val Asn Thr Leu Asn
945                 950                 955                 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Gly Tyr Ser Ser Ser Lys Glu
                965                 970                 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
            980                 985                 990

Leu Phe Ser Thr Gly Leu Asn Thr  Ile Thr Asp Ala Ala  Lys Val Val
        995                 1000                1005

Glu Leu  Val Ser Thr Ala Leu  Asp Glu Thr Ile Asp  Leu Leu Pro
    1010                1015                1020

Thr Leu  Ser Glu Gly Leu Pro  Val Ile Ala Thr Ile  Ile Asp Gly
    1025                1030                1035

Val Ser  Leu Gly Ala Ala Ile  Lys Glu Leu Ser Glu  Thr Ser Asp
    1040                1045                1050

Pro Leu  Leu Arg Gln Glu Ile  Glu Ala Lys Ile Gly  Ile Met Ala
    1055                1060                1065

Val Asn  Leu Thr Ala Ala Thr  Thr Ala Ile Ile Thr  Ser Ser Leu
    1070                1075                1080

Gly Ile  Ala Ser Gly Phe Ser  Ile Leu Leu Val Pro  Leu Ala Gly
    1085                1090                1095

Ile Ser  Ala Gly Ile Pro Ser  Leu Val Asn Asn Glu  Leu Val Leu
    1100                1105                1110
```

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Arg Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Ile Ser
1115 1120 1125

Leu Val Glu Thr Glu Gly Ala Phe Thr Leu Leu Asp Asp Lys Ile
1130 1135 1140

Met Ile Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn
1145 1150 1155

Asn Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu
1160 1165 1170

Gly Gly Ser Gly His Thr Val Thr Asn Asp Ile Asp His Phe Phe
1175 1180 1185

Ser Ser Pro Thr Ile Thr Tyr Ile Lys Pro His Leu Ser Ile Tyr
1190 1195 1200

Asp Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp
1205 1210 1215

Leu Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu
1220 1225 1230

Thr Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Glu Gly Thr
1235 1240 1245

Lys Leu Leu Asp Arg Ile Arg Asp His Tyr Lys Gly Glu Phe Tyr
1250 1255 1260

Trp Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu
1265 1270 1275

Lys Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser
1280 1285 1290

Asn Asn Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu His Ile
1295 1300 1305

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```
Arg Glu  Lys Leu Ser Tyr Ser  Phe His Gly Ser Gly  Gly Thr Tyr
    1310                1315                1320

Ala Leu  Ser Leu Ser Gln Tyr  Asn Met Gly Ile Asn  Ile Glu Leu
    1325                1330                1335

Ser Glu  Ser Asp Val Trp Ile  Ile Asp Val Asp Asn  Val Val Arg
    1340                1345                1350

Asp Val  Thr Ile Asp Ser Asp  Lys Ile Lys Lys Gly  Asp Leu Ile
    1355                1360                1365

Glu Gly  Ile Leu Ser Thr Leu  Ser Ile Glu Asp Asn  Lys Ile Ile
    1370                1375                1380

Leu Asn  His His Glu Ile Asn  Phe Ser Gly Asp Val  Asn Gly Ser
    1385                1390                1395

Asn Gly  Phe Ile Ser Leu Thr  Phe Ser Ile Leu Glu  Gly Ile Asn
    1400                1405                1410

Ala Ile  Ile Glu Val Asp Leu  Leu Ser Lys Ser Tyr  Lys Leu Leu
    1415                1420                1425

Ile Ser  Gly Glu Leu Lys Ile  Leu Met Leu Asn Ser  Asn His Ile
    1430                1435                1440

Gln Gln  Lys Ile Asp Tyr Ile  Gly Phe Asn Ser Glu  Leu Gln Lys
    1445                1450                1455

Asn Ile  Pro Tyr Ser Phe Val  Asp Ser Glu Gly Lys  Glu Asn Gly
    1460                1465                1470

Phe Ile  Asn Gly Ser Thr Lys  Glu Gly Leu Phe Val  Ser Glu Leu
    1475                1480                1485

Pro Asp  Val Val Leu Ile Ser  Lys Val Tyr Met Asp  Asp Ser Lys
    1490                1495                1500
```

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Pro Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val
1505 1510 1515

Ile Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys
1520 1525 1530

Asp Asp Ile Lys Ile Ser Leu Ser Phe Thr Leu Gln Asp Glu Lys
1535 1540 1545

Thr Ile Lys Leu Asn Gly Val His Leu Asp Glu Ser Gly Val Ala
1550 1555 1560

Glu Ile Leu Lys Phe Met Asn Lys Lys Gly Ser Thr Asn Thr Ser
1565 1570 1575

Asp Ser Leu Met Ser Phe Leu Glu Ser Val Asn Ile Lys Ser Ile
1580 1585 1590

Phe Val Asn Phe Leu Gln Ser Lys Ile Asn Phe Ile Leu Asp Ala
1595 1600 1605

Asn Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe
1610 1615 1620

Ile Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe
1625 1630 1635

Asn Thr Leu Glu Thr Thr Tyr Thr Leu Tyr Val Gly Asn Arg Gln
1640 1645 1650

Asn Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp
1655 1660 1665

Ile Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly
1670 1675 1680

Ile Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr
1685 1690 1695

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```
Thr Asp  Glu Ile Asn Ile Thr  Pro Val Tyr Glu Thr  Asn Asn Asn
    1700                1705                1710

Tyr Pro  Glu Val Ile Val Leu  Asp Ala Asn Tyr Ile  Asn Glu Lys
    1715                1720                1725

Ile Asn  Val Asn Ile Asn Asp  Leu Ser Ile Arg Tyr  Val Trp Ser
    1730                1735                1740

Asn Asp  Gly Asn Asp Phe Ile  Leu Met Ser Thr Ser  Glu Glu Asn
    1745                1750                1755

Lys Val  Ser Gln Val Lys Ile  Arg Phe Val Asn Val  Phe Lys Asp
    1760                1765                1770

Lys Thr  Leu Ala Asn Lys Leu  Ser Phe Asn Phe Ser  Asp Lys Gln
    1775                1780                1785

Asp Val  Pro Val Ser Glu Ile  Ile Ser Ala Phe Thr  Pro Ser Tyr
    1790                1795                1800

Tyr Glu  Asp Gly Leu Ile Gly  Tyr Asp Leu Gly Leu  Val Ser Leu
    1805                1810                1815

Tyr Asn  Glu Lys Phe Tyr Ile  Asn Asn Phe Gly Met  Met Val Ser
    1820                1825                1830

Gly Leu  Ile Tyr Ile Asn Asp  Ser Leu Tyr Tyr Phe  Lys Pro Pro
    1835                1840                1845

Val Asn  Asn Leu Ile Thr Gly  Phe Val Thr Val Gly  Asp Asp Lys
    1850                1855                1860

Tyr Tyr  Phe Asn Pro Thr Asn  Gly Gly Ala Ala Ser  Ile Gly Glu
    1865                1870                1875

Thr Ile  Ile Asn Asp Lys Asn  Tyr Tyr Phe Asn Gln  Ser Gly Ile
    1880                1885                1890
```

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```
Leu Gln  Thr Gly Val Phe Ser  Thr Glu Asp Gly Leu  Lys Tyr Phe
    1895                1900                1905

Ala Pro  Ala Asn Thr Leu Asp  Glu Asn Leu Glu Gly  Glu Ala Ile
    1910                1915                1920

Asp Phe  Thr Gly Lys Leu Ile  Ile Asp Glu Asn Ile  Tyr Tyr Phe
    1925                1930                1935

Glu Asp  Asn Tyr Arg Gly Ala  Val Glu Trp Lys Glu  Leu Asp Gly
    1940                1945                1950

Glu Met  Tyr Tyr Phe Ser Pro  Glu Thr Gly Lys Ala  Phe Lys Gly
    1955                1960                1965

Leu Asn  Gln Ile Gly Asp Asp  Lys Tyr Tyr Phe Asn  Ser Asp Gly
    1970                1975                1980

Ile Met  Gln Lys Gly Phe Val  Ser Ile Asn Asp Lys  Lys Tyr Tyr
    1985                1990                1995

Phe Asp  Asp Ser Gly Val Met  Lys Val Gly Tyr Ile  Glu Ile Asp
    2000                2005                2010

Gly Lys  Tyr Phe Tyr Phe Ala  Glu Asn Gly Glu Met  Gln Ile Gly
    2015                2020                2025

Val Phe  Asn Thr Ser Asp Gly  Phe Lys Tyr Phe Ala  His His Asn
    2030                2035                2040

Glu Asp  Leu Gly Asn Glu Glu  Gly Glu Ala Ile Ser  Tyr Ser Gly
    2045                2050                2055

Ile Leu  Asn Phe Asn Asn Lys  Ile Tyr Tyr Phe Asp  Tyr Ser Phe
    2060                2065                2070

Thr Ala  Val Val Gly Trp Lys  Asp Leu Glu Asp Gly  Ser Lys Tyr
    2075                2080                2085
```

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Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Val Gly Leu Ser Leu
2090 2095 2100

Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln
2105 2110 2115

Val Gly Phe Val Thr Ile Asn Asn Lys Val Phe Tyr Phe Ser Asp
2120 2125 2130

Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
2135 2140 2145

Phe Tyr Ile Asp Glu Lys Gly Ile Val Gln Ile Gly Val Phe Asp
2150 2155 2160

Thr Ser Asp Glu Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn
2165 2170 2175

Asp Asn Ile Tyr Gly Gln Ala Val Asp Tyr Ser Gly Leu Val Arg
2180 2185 2190

Val Gly Glu Asp Ile Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu
2195 2200 2205

Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile
2225 2230 2235

Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Asn Gly Ile Met Arg Thr
2240 2245 2250

Gly Leu Ile Ser Phe Glu Asn Asn Asp Tyr Tyr Phe Asn Glu Asn
2255 2260 2265

Gly Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe
2270 2275 2280

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Tyr Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr
2285 2290 2295

Gln Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu
2300 2305 2310

Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu
2315 2320 2325

Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr
2330 2335 2340

Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp
2345 2350 2355

Thr Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 182
<211> 2367
<212> PRT
<213> Clostridium difficile

<400> 182

Met Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg
1 5 10 15

Phe Arg Val Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
20 25 30

Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
35 40 45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Thr Tyr Ile Asp Thr Tyr Lys
50 55 60

Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65 70 75 80

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```
Ile Glu Ile Leu Glu Leu Lys Asn Ser Asn Leu Thr Pro Val Glu Lys
                85                  90                  95

Asn Leu His Phe Ile Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
            100                 105                 110

Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
        115                 120                 125

Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
    130                 135                 140

Ile Ile Glu Ser Ala Ser Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145                 150                 155                 160

Leu Asn Asp Pro Glu Phe Asn His Thr Ala Phe Phe Arg Lys Arg Met
                165                 170                 175

Gln Ile Ile Tyr Asp Lys Gln Gln Asn Phe Ile Asn Tyr Tyr Lys Ala
            180                 185                 190

Gln Lys Glu Glu Asn Pro Asp Leu Ile Ile Asp Asp Ile Val Lys Thr
        195                 200                 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Asp Ile Asp Glu Leu Asn Ala Tyr
    210                 215                 220

Ile Glu Glu Ser Leu Asn Lys Val Thr Glu Asn Ser Gly Asn Asp Val
225                 230                 235                 240

Arg Asn Phe Glu Glu Phe Lys Thr Gly Glu Val Phe Asn Leu Tyr Glu
                245                 250                 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Gly Ala Ser Asp Ile Leu
            260                 265                 270

Arg Val Ala Ile Leu Lys Asn Ile Gly Gly Val Tyr Leu Asp Val Asp
        275                 280                 285
```

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```
Met Leu Pro Gly Ile His Pro Asp Leu Phe Lys Asp Ile Asn Lys Pro
    290                 295                 300

Asp Ser Val Lys Thr Ala Val Asp Trp Glu Glu Met Gln Leu Glu Ala
305                 310                 315                 320

Ile Met Lys His Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Lys His Phe
                325                 330                 335

Asp Thr Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala
            340                 345                 350

Ser Lys Ser Asp Lys Ser Glu Ile Phe Leu Pro Leu Gly Asp Ile Glu
        355                 360                 365

Val Ser Pro Leu Glu Val Lys Ile Ala Phe Ala Lys Gly Ser Ile Ile
    370                 375                 380

Asn Gln Ala Leu Ile Ser Ala Lys Asp Ser Tyr Cys Ser Asp Leu Leu
385                 390                 395                 400

Ile Lys Gln Ile Gln Asn Arg Tyr Lys Ile Leu Asn Asp Thr Leu Gly
                405                 410                 415

Pro Ile Ile Ser Gln Gly Asn Asp Phe Asn Thr Thr Met Asn Asn Phe
            420                 425                 430

Gly Glu Ser Leu Gly Ala Ile Ala Asn Glu Glu Asn Ile Ser Phe Ile
        435                 440                 445

Ala Lys Ile Gly Ser Tyr Leu Arg Val Gly Phe Tyr Pro Glu Ala Asn
    450                 455                 460

Thr Thr Ile Thr Leu Ser Gly Pro Thr Ile Tyr Ala Gly Ala Tyr Lys
465                 470                 475                 480

Asp Leu Leu Thr Phe Lys Glu Met Ser Ile Asp Thr Ser Ile Leu Ser
                485                 490                 495
```

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```
Ser Glu Leu Arg Asn Phe Glu Phe Pro Lys Val Asn Ile Ser Gln Ala
            500                 505                 510

Thr Glu Gln Glu Lys Asn Ser Leu Trp Gln Phe Asn Glu Glu Arg Ala
        515                 520                 525

Lys Ile Gln Phe Glu Glu Tyr Lys Lys Asn Tyr Phe Glu Gly Ala Leu
    530                 535                 540

Gly Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Thr Val Thr Asp Lys
545                 550                 555                 560

Glu Tyr Leu Leu Glu Lys Ile Ser Ser Ser Thr Lys Ser Ser Glu Arg
                565                 570                 575

Gly Tyr Val His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr
            580                 585                 590

Glu Ala Ala Cys Asn Leu Phe Ala Lys Asn Pro Tyr Asp Ser Ile Leu
        595                 600                 605

Phe Gln Lys Asn Ile Glu Asp Ser Glu Val Ala Tyr Tyr Tyr Asn Pro
    610                 615                 620

Thr Asp Ser Glu Ile Gln Glu Ile Asp Lys Tyr Arg Ile Pro Asp Arg
625                 630                 635                 640

Ile Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys
                645                 650                 655

Ala Glu Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu
            660                 665                 670

Ser Ser Glu Ile Glu Thr Ala Ile Gly Leu Ala Lys Glu Asp Ile Ser
        675                 680                 685

Pro Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr
    690                 695                 700
```

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```
Ser Val Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Arg Val
705                 710                 715                 720

Lys Asp Lys Val Ser Glu Leu Met Pro Ser Met Ser Gln Asp Ser Ile
                725                 730                 735

Ile Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
            740                 745                 750

Arg Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser
        755                 760                 765

Ile Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys
    770                 775                 780

Glu Asn Lys Ile Ile Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr
785                 790                 795                 800

Leu Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu
                805                 810                 815

Glu Glu Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn
            820                 825                 830

Ile Glu Thr Gln Val Val Glu Glu Arg Ile Glu Glu Ala Lys Ser Leu
        835                 840                 845

Thr Ser Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu
    850                 855                 860

Ser Ile Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu
865                 870                 875                 880

Asp Ser His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly
                885                 890                 895

Phe Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val
            900                 905                 910
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Glu Thr Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu
        915                 920                 925

Glu Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys
    930                 935                 940

Leu Val Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu
945                 950                 955                 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys
                965                 970                 975

Glu Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala
            980                 985                 990

Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Thr Asp Ala  Ala Lys Val
        995                 1000                1005

Val Glu  Leu Val Ser Thr Ala  Leu Asp Glu Thr Ile  Asp Leu Leu
    1010                1015                1020

Pro Thr  Leu Ser Glu Gly Leu  Pro Ile Ile Ala Thr  Ile Ile Asp
    1025                1030                1035

Gly Val  Ser Leu Gly Ala Ala  Ile Lys Glu Leu Ser  Glu Thr Ser
    1040                1045                1050

Asp Pro  Leu Leu Arg Gln Glu  Ile Glu Ala Lys Ile  Gly Ile Met
    1055                1060                1065

Ala Val  Asn Leu Thr Thr Ala  Thr Thr Ala Ile Ile  Thr Ser Ser
    1070                1075                1080

Leu Gly  Ile Ala Ser Gly Phe  Ser Ile Leu Leu Val  Pro Leu Ala
    1085                1090                1095

Gly Ile  Ser Ala Gly Ile Pro  Ser Leu Val Asn Asn  Glu Leu Val
    1100                1105                1110
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Leu Arg Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Val
1115 1120 1125

Ser Leu Val Glu Thr Glu Gly Val Phe Thr Leu Leu Asp Asp Lys
1130 1135 1140

Val Met Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe
1175 1180 1185

Phe Ser Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile
1190 1195 1200

Tyr Asp Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys
1205 1210 1215

Asp Leu Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp
1220 1225 1230

Glu Thr Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly
1235 1240 1245

Thr Lys Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe
1250 1255 1260

Tyr Trp Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr
1265 1270 1275

Leu Lys Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp
1280 1285 1290

Ser Asn Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr
1295 1300 1305

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Ile Arg Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr
1310 1315 1320

Tyr Ala Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu
1325 1330 1335

Leu Ser Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val
1340 1345 1350

Arg Asp Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu
1355 1360 1365

Ile Glu Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile
1370 1375 1380

Ile Leu Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly
1385 1390 1395

Ser Asn Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile
1400 1405 1410

Asn Ala Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu
1415 1420 1425

Leu Ile Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His
1430 1435 1440

Ile Gln Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln
1445 1450 1455

Lys Asn Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn
1460 1465 1470

Gly Phe Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu
1475 1480 1485

Leu Pro Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser
1490 1495 1500

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Lys Pro  Ser Phe Gly Tyr Tyr  Ser Asn Asn Leu Lys  Asp Val Lys
    1505                1510                1515

Val Ile  Thr Lys Asp Asn Val  Asn Ile Leu Thr Gly  Tyr Tyr Leu
    1520                1525                1530

Lys Asp  Asp Ile Lys Ile Ser  Leu Ser Leu Thr Leu  Gln Asp Glu
    1535                1540                1545

Lys Thr  Ile Lys Leu Asn Ser  Val His Leu Asp Glu  Ser Gly Val
    1550                1555                1560

Ala Glu  Ile Leu Lys Phe Met  Asn Arg Lys Gly Ser  Thr Asn Thr
    1565                1570                1575

Ser Asp  Ser Leu Met Ser Phe  Leu Glu Ser Met Asn  Ile Lys Ser
    1580                1585                1590

Ile Phe  Val Asn Phe Leu Gln  Ser Asn Ile Lys Phe  Ile Leu Asp
    1595                1600                1605

Ala Asn  Phe Ile Ile Ser Gly  Thr Thr Ser Ile Gly  Gln Phe Glu
    1610                1615                1620

Phe Ile  Cys Asp Glu Asn Asn  Asn Ile Gln Pro Tyr  Phe Ile Lys
    1625                1630                1635

Phe Asn  Thr Leu Glu Thr Asn  Tyr Thr Leu Tyr Val  Gly Asn Arg
    1640                1645                1650

Gln Asn  Met Ile Val Glu Pro  Asn Tyr Asp Leu Asp  Asp Ser Gly
    1655                1660                1665

Asp Ile  Ser Ser Thr Val Ile  Asn Phe Ser Gln Lys  Tyr Leu Tyr
    1670                1675                1680

Gly Ile  Asp Ser Cys Val Asn  Lys Val Val Ile Ser  Pro Asn Ile
    1685                1690                1695
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```
Tyr Thr  Asp Glu Ile Asn Ile  Thr Pro Val Tyr Glu  Thr Asn Asn
    1700                1705                1710

Thr Tyr  Pro Glu Val Ile Val  Leu Asp Ala Asn Tyr  Ile Asn Glu
    1715                1720                1725

Lys Ile  Asn Val Asn Ile Asn  Asp Leu Ser Ile Arg  Tyr Val Trp
    1730                1735                1740

Ser Asn  Asp Gly Asn Asp Phe  Ile Leu Met Ser Thr  Ser Glu Glu
    1745                1750                1755

Asn Lys  Val Ser Gln Val Lys  Ile Arg Phe Val Asn  Val Phe Lys
    1760                1765                1770

Asp Lys  Thr Leu Ala Asn Lys  Leu Ser Phe Asn Phe  Ser Asp Lys
    1775                1780                1785

Gln Asp  Val Pro Val Ser Glu  Ile Ile Leu Ser Phe  Thr Pro Ser
    1790                1795                1800

Tyr Tyr  Glu Asp Gly Leu Ile  Gly Tyr Asp Leu Gly  Leu Val Ser
    1805                1810                1815

Leu Tyr  Asn Glu Lys Phe Tyr  Ile Asn Asn Phe Gly  Met Met Val
    1820                1825                1830

Ser Gly  Leu Ile Tyr Ile Asn  Asp Ser Leu Tyr Tyr  Phe Lys Pro
    1835                1840                1845

Pro Val  Asn Asn Leu Ile Thr  Gly Phe Val Thr Val  Gly Asp Asp
    1850                1855                1860

Lys Tyr  Tyr Phe Asn Pro Ile  Asn Gly Gly Ala Ala  Ser Ile Gly
    1865                1870                1875

Glu Thr  Ile Ile Asp Asp Lys  Asn Tyr Tyr Phe Asn  Gln Ser Gly
    1880                1885                1890
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Val Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr
1895 1900 1905

Phe Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala
1910 1915 1920

Ile Asp Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr
1925 1930 1935

Phe Glu Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp
1940 1945 1950

Gly Glu Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys
1955 1960 1965

Gly Leu Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp
1970 1975 1980

Gly Val Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His
1985 1990 1995

Tyr Phe Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile
2000 2005 2010

Asp Gly Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile
2015 2020 2025

Gly Val Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His
2030 2035 2040

Asn Glu Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser
2045 2050 2055

Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser
2060 2065 2070

Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys
2075 2080 2085

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Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser
2090 2095 2100

Leu Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met
2105 2110 2115

Gln Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser
2120 2125 2130

Asp Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn
2135 2140 2145

Tyr Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe
2150 2155 2160

Asp Thr Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val
2165 2170 2175

Asn Asp Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val
2180 2185 2190

Arg Val Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile
2195 2200 2205

Glu Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr
2210 2215 2220

Tyr Phe Asp Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu
2225 2230 2235

Ile Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg
2240 2245 2250

Thr Gly Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu
2255 2260 2265

Asn Gly Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met
2270 2275 2280

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Phe Tyr Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn
2285 2290 2295

Thr Pro Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp
2300 2305 2310

Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp
2315 2320 2325

Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala
2330 2335 2340

Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro
2345 2350 2355

Asp Thr Ala Gln Leu Val Ile Ser Glu
2360 2365

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<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 183

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1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu

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65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
130 135 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145 150 155 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
165 170 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
180 185 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
195 200 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
210 215 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225 230 235 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Ala Val Ala Met Leu

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275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu

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485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
530 535 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545 550 555 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
565 570 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
580 585 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
595 600 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
610 615 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625 630 635 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
645 650 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
660 665 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
675 680 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr

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690 695 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705 710 715 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
725 730 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
740 745 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
755 760 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
770 775 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785 790 795 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
805 810 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
820 825 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
835 840 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
850 855 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865 870 875 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
885 890 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val

900 905 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
915 920 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
930 935 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945 950 955 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Lys Tyr Ser Ser Asn Lys
965 970 975

Lys Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
980 985 990

Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln Leu
995 1000 1005

Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val Leu
1010 1015 1020

Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu Asp
1025 1030 1035

Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu His
1040 1045 1050

Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val Leu
1055 1060 1065

Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser Ile
1070 1075 1080

Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile Ala
1085 1090 1095

Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile

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1100 1105 1110

Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu
1115 1120 1125

Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys
1130 1135 1140

Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly
1235 1240 1245

Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile

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1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile
1355 1360 1365

Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Ile
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe Asn

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1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile

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1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Ile Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly

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1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr

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2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe

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2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
2330 2335 2340

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala

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2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr

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2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

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<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

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Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

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```
Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320
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Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

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```
Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545                 550                 555                 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
            580                 585                 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
        595                 600                 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
    610                 615                 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625                 630                 635                 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
                645                 650                 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
            660                 665                 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
        675                 680                 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
    690                 695                 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705                 710                 715                 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
                725                 730                 735
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```
Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
            740                 745                 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
        755                 760                 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
    770                 775                 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785                 790                 795                 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
                805                 810                 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
            820                 825                 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
        835                 840                 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
    850                 855                 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865                 870                 875                 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
                885                 890                 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
        915                 920                 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940
```

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```
Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Lys Tyr Asn Ser Ser Lys Lys Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Ile  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050

Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
    1055                1060                1065

Asn Leu  Thr Thr Ala Thr Thr  Ala Ile Ile Thr Ser  Ser Leu Gly
    1070                1075                1080

Ile Ala  Ser Gly Phe Ser Ile  Leu Leu Val Pro Leu  Ala Gly Ile
    1085                1090                1095

Ser Ala  Gly Ile Pro Ser Leu  Val Asn Asn Glu Leu  Val Leu Arg
    1100                1105                1110

Asp Lys  Ala Thr Lys Val Val  Asp Tyr Phe Lys His  Val Ser Leu
    1115                1120                1125

Val Glu  Thr Glu Gly Val Phe  Thr Leu Leu Asp Asp  Lys Ile Met
    1130                1135                1140
```

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```
Met Pro  Gln Asp Asp Leu Val  Ile Ser Glu Ile Asp  Phe Asn Asn
    1145                1150                1155

Asn Ser  Ile Val Leu Gly Lys  Cys Glu Ile Trp Arg  Met Glu Gly
    1160                1165                1170

Gly Ser  Gly His Thr Val Thr  Asp Asp Ile Asp His  Phe Phe Ser
    1175                1180                1185

Ala Pro  Ser Ile Thr Tyr Arg  Glu Pro His Leu Ser  Ile Tyr Asp
    1190                1195                1200

Val Leu  Glu Val Gln Lys Glu  Glu Leu Asp Leu Ser  Lys Asp Leu
    1205                1210                1215

Met Val  Leu Pro Asn Ala Pro  Asn Arg Val Phe Ala  Trp Glu Thr
    1220                1225                1230

Gly Trp  Thr Pro Gly Leu Arg  Ser Leu Glu Asn Asp  Gly Thr Lys
    1235                1240                1245

Leu Leu  Asp Arg Ile Arg Asp  Asn Tyr Glu Gly Glu  Phe Tyr Trp
    1250                1255                1260

Arg Tyr  Phe Ala Phe Ile Ala  Asp Ala Leu Ile Thr  Thr Leu Lys
    1265                1270                1275

Pro Arg  Tyr Glu Asp Thr Asn  Ile Arg Ile Asn Leu  Asp Ser Asn
    1280                1285                1290

Thr Arg  Ser Phe Ile Val Pro  Ile Ile Thr Thr Glu  Tyr Ile Arg
    1295                1300                1305

Glu Lys  Leu Ser Tyr Ser Phe  Tyr Gly Ser Gly Gly  Thr Tyr Ala
    1310                1315                1320

Leu Ser  Leu Ser Gln Tyr Asn  Met Gly Ile Asn Ile  Glu Leu Ser
    1325                1330                1335
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Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile Leu
1370 1375 1380

Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

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```
Asp Ile  Lys Ile Ser Leu Ser  Leu Thr Leu Gln Asp  Glu Lys Thr
    1535                1540                1545

Ile Lys  Leu Asn Ser Val His  Leu Asp Glu Ser Gly  Val Ala Glu
    1550                1555                1560

Ile Leu  Lys Phe Met Asn Arg  Lys Gly Asn Thr Asn  Thr Ser Asp
    1565                1570                1575

Ser Leu  Met Ser Phe Leu Glu  Ser Met Asn Ile Lys  Ser Ile Phe
    1580                1585                1590

Val Asn  Phe Leu Gln Ser Asn  Ile Lys Phe Ile Leu  Asp Ala Asn
    1595                1600                1605

Phe Ile  Ile Ser Gly Thr Thr  Ser Ile Gly Gln Phe  Glu Phe Ile
    1610                1615                1620

Cys Asp  Glu Asn Asp Asn Ile  Gln Pro Tyr Phe Ile  Lys Phe Asn
    1625                1630                1635

Thr Leu  Glu Thr Asn Tyr Thr  Leu Tyr Val Gly Asn  Arg Gln Asn
    1640                1645                1650

Met Ile  Val Glu Pro Asn Tyr  Asp Leu Asp Asp Ser  Gly Asp Ile
    1655                1660                1665

Ser Ser  Thr Val Ile Asn Phe  Ser Gln Lys Tyr Leu  Tyr Gly Ile
    1670                1675                1680

Asp Ser  Cys Val Asn Lys Val  Val Ile Ser Pro Asn  Ile Tyr Thr
    1685                1690                1695

Asp Glu  Ile Asn Ile Thr Pro  Val Tyr Glu Thr Asn  Asn Thr Tyr
    1700                1705                1710

Pro Glu  Val Ile Val Leu Asp  Ala Asn Tyr Ile Asn  Glu Lys Ile
    1715                1720                1725
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```
Asn Val  Asn Ile Asn Asp Leu  Ser Ile Arg Tyr Val  Trp Ser Asn
    1730                1735                1740

Asp Gly  Asn Asp Phe Ile Leu  Met Ser Thr Ser Glu  Glu Asn Lys
    1745                1750                1755

Val Ser  Gln Val Lys Ile Arg  Phe Val Asn Val Phe  Lys Asp Lys
    1760                1765                1770

Thr Leu  Ala Asn Lys Leu Ser  Phe Asn Phe Ser Asp  Lys Gln Asp
    1775                1780                1785

Val Pro  Val Ser Glu Ile Ile  Leu Ser Phe Thr Pro  Ser Tyr Tyr
    1790                1795                1800

Glu Asp  Gly Leu Ile Gly Tyr  Asp Leu Gly Leu Val  Ser Leu Tyr
    1805                1810                1815

Asn Glu  Lys Phe Tyr Ile Asn  Asn Phe Gly Met Met  Val Ser Gly
    1820                1825                1830

Leu Ile  Tyr Ile Asn Asp Ser  Leu Tyr Tyr Phe Lys  Pro Pro Val
    1835                1840                1845

Asn Asn  Leu Ile Thr Gly Phe  Val Thr Val Gly Asp  Asp Lys Tyr
    1850                1855                1860

Tyr Phe  Asn Pro Ile Asn Gly  Gly Ala Ala Ser Ile  Gly Glu Thr
    1865                1870                1875

Ile Ile  Asp Asp Lys Asn Tyr  Tyr Phe Asn Gln Ser  Gly Val Leu
    1880                1885                1890

Gln Thr  Gly Val Phe Ser Thr  Glu Asp Gly Phe Lys  Tyr Phe Ala
    1895                1900                1905

Pro Ala  Asn Thr Leu Asp Glu  Asn Leu Glu Gly Glu  Ala Ile Asp
    1910                1915                1920
```

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```
Phe Thr  Gly Lys Leu Ile Ile  Asp Glu Asn Ile Tyr  Tyr Phe Asp
    1925                1930                1935

Asp Asn  Tyr Arg Gly Ala Val  Glu Trp Lys Glu Leu  Asp Gly Glu
    1940                1945                1950

Met His  Tyr Phe Ser Pro Glu  Thr Gly Lys Ala Phe  Lys Gly Leu
    1955                1960                1965

Asn Gln  Ile Gly Asp Tyr Lys  Tyr Tyr Phe Asn Ser  Asp Gly Val
    1970                1975                1980

Met Gln  Lys Gly Phe Val Ser  Ile Asn Asp Asn Lys  His Tyr Phe
    1985                1990                1995

Asp Asp  Ser Gly Val Met Lys  Val Gly Tyr Thr Glu  Ile Asp Gly
    2000                2005                2010

Lys His  Phe Tyr Phe Ala Glu  Asn Gly Glu Met Gln  Ile Gly Val
    2015                2020                2025

Phe Asn  Thr Glu Asp Gly Phe  Lys Tyr Phe Ala His  His Asn Glu
    2030                2035                2040

Asp Leu  Gly Asn Glu Glu Gly  Glu Glu Ile Ser Tyr  Ser Gly Ile
    2045                2050                2055

Leu Asn  Phe Asn Asn Lys Ile  Tyr Tyr Phe Asp Asp  Ser Phe Thr
    2060                2065                2070

Ala Val  Val Gly Trp Lys Asp  Leu Glu Asp Gly Ser  Lys Tyr Tyr
    2075                2080                2085

Phe Asp  Glu Asp Thr Ala Glu  Ala Tyr Ile Gly Leu  Ser Leu Ile
    2090                2095                2100

Asn Asp  Gly Gln Tyr Tyr Phe  Asn Asp Asp Gly Ile  Met Gln Val
    2105                2110                2115
```

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Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

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Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 185
<211> 320
<212> PRT
<213> Clostridium difficile

<400> 185

Ala Ser Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn
1 5 10 15

Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe
20 25 30

Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln
35 40 45

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr
50 55 60

Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile Asp
65 70 75 80

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr Gly
85 90 95

Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ser
100 105 110

```
Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys His Phe Tyr Phe
        115                 120                 125

Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly
    130                 135                 140

Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly
145                 150                 155                 160

Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn Ile
                165                 170                 175

Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr Ile
            180                 185                 190

Asp Gly Asn Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn
        195                 200                 205

Gly Tyr Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu
    210                 215                 220

Pro Gln Ile Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala
225                 230                 235                 240

Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr
                245                 250                 255

Gln Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
            260                 265                 270

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
        275                 280                 285

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe Glu
    290                 295                 300

Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala Pro
305                 310                 315                 320
```

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<210> 186
<211> 611
<212> PRT
<213> Clostridium difficile

<400> 186

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Ile Leu Met Ser Thr Ser Glu Glu Asn Lys Val Ser Gln Val Lys Ile
1               5                  10                  15

Arg Phe Val Asn Val Phe Lys Asp Lys Thr Leu Ala Asn Lys Leu Ser
            20                  25                  30

Phe Asn Phe Ser Asp Lys Gln Asp Val Pro Val Ser Glu Ile Ile Leu
        35                  40                  45

Ser Phe Thr Pro Ser Tyr Tyr Glu Asp Gly Leu Ile Gly Tyr Asp Leu
    50                  55                  60

Gly Leu Val Ser Leu Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly
65                  70                  75                  80

Met Met Val Ser Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe
                85                  90                  95

Lys Pro Pro Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp
            100                 105                 110

Asp Lys Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly
        115                 120                 125

Glu Thr Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val
    130                 135                 140

Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala
145                 150                 155                 160

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp Phe
                165                 170                 175

Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp Asp Asn
```

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```
            180                 185                 190

Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu Met His Tyr
        195                 200                 205

Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu Asn Gln Ile Gly
    210                 215                 220

Asp Tyr Lys Tyr Tyr Phe Asn Ser Asp Gly Val Met Gln Lys Gly Phe
225                 230                 235                 240

Val Ser Ile Asn Asp Asn Lys His Tyr Phe Asp Asp Ser Gly Val Met
                245                 250                 255

Lys Val Gly Tyr Thr Glu Ile Asp Gly Lys His Phe Tyr Phe Ala Glu
            260                 265                 270

Asn Gly Glu Met Gln Ile Gly Val Phe Asn Thr Glu Asp Gly Phe Lys
        275                 280                 285

Tyr Phe Ala His His Asn Glu Asp Leu Gly Asn Glu Glu Gly Glu Glu
    290                 295                 300

Ile Ser Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe
305                 310                 315                 320

Asp Asp Ser Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly
                325                 330                 335

Ser Lys Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu
            340                 345                 350

Ser Leu Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met
        355                 360                 365

Gln Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp
    370                 375                 380

Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
```

385 390 395 400

Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr Ser
405 410 415

Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn Ile
420 425 430

Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val Gly Glu Asp
435 440 445

Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile Tyr
450 455 460

Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asn Pro Glu Thr Lys
465 470 475 480

Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp Asp Ile Lys Tyr Tyr Phe
485 490 495

Asp Glu Lys Gly Ile Met Arg Thr Gly Leu Ile Ser Phe Glu Asn Asn
500 505 510

Asn Tyr Tyr Phe Asn Glu Asn Gly Glu Met Gln Phe Gly Tyr Ile Asn
515 520 525

Ile Glu Asp Lys Met Phe Tyr Phe Gly Glu Asp Gly Val Met Gln Ile
530 535 540

Gly Val Phe Asn Thr Pro Asp Gly Phe Lys Tyr Phe Ala His Gln Asn
545 550 555 560

Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp
565 570 575

Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala
580 585 590

Ala Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro

595 600 605

Asp Thr Ala
610

<210> 187
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Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
1 5 10 15

Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr
20 25 30

Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn
35 40 45

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu
50 55 60

Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe Leu Thr Leu Asn Gly Lys
65 70 75 80

Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Trp Arg Ile
85 90 95

Ile Asn Asn Lys Lys Tyr Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala
100 105 110

Ile His Leu Cys Thr Ile Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp
115 120 125

Gly Ile Leu Gln Asn Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr
130 135 140

Phe Asp Ala Asn Asn Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly
145 150 155 160

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Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn
                165                 170                 175

Ile Glu Gly Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn
            180                 185                 190

Gly Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp
        195                 200                 205

Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
    210                 215                 220

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
225                 230                 235                 240

Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys
                245                 250                 255

Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr Gly Tyr Thr
            260                 265                 270

Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln
        275                 280                 285

Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala
    290                 295                 300

Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn
305                 310                 315                 320

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser
                325                 330                 335

Lys Ala Val Thr Gly Leu Arg Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
            340                 345                 350

Asn Thr Asn Thr Ala Val Ala Val Thr Gly Trp Gln Thr Ile Asn Gly
        355                 360                 365
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Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr
    370                 375                 380

Thr Ile Ile Ser Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met
385                 390                 395                 400

Gln Ile Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro
                405                 410                 415

Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln
            420                 425                 430

Asn Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn
        435                 440                 445

Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr
    450                 455                 460

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile Asp
465                 470                 475                 480

Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly Val Phe
                485                 490                 495

Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala
            500                 505                 510

Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu His
        515                 520                 525

Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Val Thr
    530                 535                 540

Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr Tyr Phe Met Pro Asp Thr
545                 550                 555                 560

Ala Met Ala Ala Ala Gly Gly Leu Phe Glu Ile Asp Gly Val Ile Tyr
                565                 570                 575
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```
Phe Phe Gly Val Asp Gly Val Lys Ala Pro Gly Phe Val Ser Ile Asn
            580                 585                 590

Asp Asn Lys His Tyr Phe Asp Asp Ser Gly Val Met Lys Val Gly Tyr
        595                 600                 605

Thr Glu Ile Asp Gly Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met
    610                 615                 620

Gln Ile Gly Val Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His
625                 630                 635                 640

His Asn Glu Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser
                645                 650                 655

Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe
            660                 665                 670

Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
        675                 680                 685

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile Asn
    690                 695                 700

Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val Gly Phe
705                 710                 715                 720

Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser Gly Ile Ile
                725                 730                 735

Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe Tyr Ile Asp Asp
            740                 745                 750

Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr Ser Asp Gly Tyr Lys
        755                 760                 765

Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn Ile Tyr Gly Gln Ala
    770                 775                 780
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Val Glu Tyr Ser Gly Leu Val Arg Val Gly Glu Asp Val Tyr Tyr Phe
785 790 795 800

Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile Tyr Asp Met Glu Asn
805 810 815

Glu Ser Asp Lys Tyr Tyr Phe Asn Pro Glu Thr Lys Lys Ala Cys Lys
820 825 830

Gly Ile Asn Leu Ile Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly
835 840 845

Ile Met Arg Thr Gly Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe
850 855 860

Asn Glu Asn Gly Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys
865 870 875 880

Met Phe Tyr Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn
885 890 895

Thr Pro Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu
900 905 910

Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
915 920 925

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly Ser
930 935 940

Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr Ala Gln
945 950 955 960

Leu Val Ile Ser Glu
965

<210> 188
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<212> PRT
<213> Clostridium difficile

<400> 188

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1 5 10 15

Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr
20 25 30

Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn
35 40 45

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu
50 55 60

Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe Leu Thr Leu Asn Gly Lys
65 70 75 80

Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Trp Arg Ile
85 90 95

Ile Asn Asn Lys Lys Tyr Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala
100 105 110

Ile His Leu Cys Thr Ile Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp
115 120 125

Gly Ile Leu Gln Asn Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr
130 135 140

Phe Asp Ala Asn Asn Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly
145 150 155 160

Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn
165 170 175

Ile Glu Gly Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn
180 185 190

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```
Gly Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp
        195                 200                 205

Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
    210                 215                 220

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
225                 230                 235                 240

Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys
                245                 250                 255

Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr Gly Tyr Thr
            260                 265                 270

Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln
        275                 280                 285

Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala
    290                 295                 300

Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn
305                 310                 315                 320

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser
                325                 330                 335

Lys Ala Val Thr Gly Leu Arg Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
            340                 345                 350

Asn Thr Asn Thr Ala Val Ala Val Thr Gly Trp Gln Thr Ile Asn Gly
        355                 360                 365

Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr
    370                 375                 380

Thr Ile Ile Ser Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met
385                 390                 395                 400
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```
Gln Ile Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro
                405                 410                 415

Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln
            420                 425                 430

Asn Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn
        435                 440                 445

Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr
    450                 455                 460

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile Asp
465                 470                 475                 480

Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly Val Phe
                485                 490                 495

Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala
            500                 505                 510

Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu His
        515                 520                 525

Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Val Thr
    530                 535                 540

Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr Tyr Phe Met Pro Asp Thr
545                 550                 555                 560

Ala Met Ala Ala Ala Gly Gly Leu Asn Gln Ile Gly Asp Tyr Lys Tyr
                565                 570                 575

Tyr Phe Asn Ser Asp Gly Val Met Gln Lys Gly Phe Val Ser Ile Asn
            580                 585                 590

Asp Asn Lys His Tyr Phe Asp Asp Ser Gly Val Met Lys Val Gly Tyr
        595                 600                 605
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Thr Glu Ile Asp Gly Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met
610 615 620

Gln Ile Gly Val Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His
625 630 635 640

His Asn Glu Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser
645 650 655

Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe
660 665 670

Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
675 680 685

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile Asn
690 695 700

Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val Gly Phe
705 710 715 720

Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser Gly Ile Ile
725 730 735

Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe Tyr Ile Asp Asp
740 745 750

Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr Ser Asp Gly Tyr Lys
755 760 765

Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn Ile Tyr Gly Gln Ala
770 775 780

Val Glu Tyr Ser Gly Leu Val Arg Val Gly Glu Asp Val Tyr Tyr Phe
785 790 795 800

Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile Tyr Asp Met Glu Asn
805 810 815

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Glu Ser Asp Lys Tyr Tyr Phe Asn Pro Glu Thr Lys Lys Ala Cys Lys
820 825 830

Gly Ile Asn Leu Ile Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly
835 840 845

Ile Met Arg Thr Gly Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe
850 855 860

Asn Glu Asn Gly Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys
865 870 875 880

Met Phe Tyr Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn
885 890 895

Thr Pro Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu
900 905 910

Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
915 920 925

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly Ser
930 935 940

Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr Ala Gln
945 950 955 960

Leu Val Ile Ser Glu
965

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<211> 832
<212> PRT
<213> Clostridium difficile

<400> 189

Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
1 5 10 15

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2013333532


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Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr
            20                  25                  30

Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn
        35                  40                  45

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu
    50                  55                  60

Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe Leu Thr Leu Asn Gly Lys
65                  70                  75                  80

Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Trp Arg Ile
                85                  90                  95

Ile Asn Asn Lys Lys Tyr Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala
            100                 105                 110

Ile His Leu Cys Thr Ile Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp
        115                 120                 125

Gly Ile Leu Gln Asn Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr
    130                 135                 140

Phe Asp Ala Asn Asn Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly
145                 150                 155                 160

Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn
                165                 170                 175

Ile Glu Gly Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn
            180                 185                 190

Gly Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp
        195                 200                 205

Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
    210                 215                 220
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Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
225                 230                 235                 240

Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys
                245                 250                 255

Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr Gly Tyr Thr
            260                 265                 270

Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln
        275                 280                 285

Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala
    290                 295                 300

Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn
305                 310                 315                 320

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser
                325                 330                 335

Lys Ala Val Thr Gly Leu Arg Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
            340                 345                 350

Asn Thr Asn Thr Ala Val Ala Val Thr Gly Trp Gln Thr Ile Asn Gly
        355                 360                 365

Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr
    370                 375                 380

Thr Ile Ile Ser Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met
385                 390                 395                 400

Gln Ile Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro
                405                 410                 415

Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln
            420                 425                 430
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2013333532

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Asn Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn
        435                 440                 445

Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr
    450                 455                 460

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile Asp
465                 470                 475                 480

Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly Val Phe
                485                 490                 495

Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala His His Asn Glu Asp Leu
            500                 505                 510

Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile Leu Asn Phe
        515                 520                 525

Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr Ala Val Val Gly
    530                 535                 540

Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr
545                 550                 555                 560

Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile Asn Asp Gly Gln Tyr Tyr
                565                 570                 575

Phe Asn Asp Asp Gly Ile Met Gln Val Gly Phe Val Thr Ile Asn Asp
            580                 585                 590

Lys Val Phe Tyr Phe Ser Asp Ser Gly Ile Ile Glu Ser Gly Val Gln
        595                 600                 605

Asn Ile Asp Asp Asn Tyr Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln
    610                 615                 620

Ile Gly Val Phe Asp Thr Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala
625                 630                 635                 640
```

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Asn Thr Val Asn Asp Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly
645 650 655

Leu Val Arg Val Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr
660 665 670

Ile Glu Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr
675 680 685

Tyr Phe Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile
690 695 700

Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly
705 710 715 720

Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly Glu
725 730 735

Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr Phe Gly
740 745 750

Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro Asp Gly Phe
755 760 765

Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu
770 775 780

Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr
785 790 795 800

Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly Ser Val Ile Ile Asp Gly
805 810 815

Glu Glu Tyr Tyr Phe Asp Pro Asp Thr Ala Gln Leu Val Ile Ser Glu
820 825 830

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<212> PRT
<213> Clostridium difficile

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<400> 190

Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
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Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr
20 25 30

Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn
35 40 45

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu
50 55 60

Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe Leu Thr Leu Asn Gly Lys
65 70 75 80

Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Trp Arg Ile
85 90 95

Ile Asn Asn Lys Lys Tyr Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala
100 105 110

Ile His Leu Cys Thr Ile Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp
115 120 125

Gly Ile Leu Gln Asn Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr
130 135 140

Phe Asp Ala Asn Asn Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly
145 150 155 160

Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn
165 170 175

Ile Glu Gly Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn
180 185 190

Gly Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp

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195 200 205

Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
210 215 220

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
225 230 235 240

Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys
245 250 255

Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr Gly Tyr Thr
260 265 270

Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln
275 280 285

Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala
290 295 300

Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn
305 310 315 320

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser
325 330 335

Lys Ala Val Thr Gly Leu Arg Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
340 345 350

Asn Thr Asn Thr Ala Val Ala Val Thr Gly Trp Gln Thr Ile Asn Gly
355 360 365

Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr
370 375 380

Thr Ile Ile Ser Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met
385 390 395 400

Gln Ile Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro

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405 410 415

Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln
420 425 430

Asn Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn
435 440 445

Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr
450 455 460

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile Asp
465 470 475 480

Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly Val Phe
485 490 495

Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala
500 505 510

Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu His
515 520 525

Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Val Thr
530 535 540

Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr Tyr Phe Met Pro Asp Thr
545 550 555 560

Ala Met Ala Ala Ala Gly Gly Glu Thr Ile Ile Asp Asp Lys Asn Tyr
565 570 575

Tyr Phe Asn Gln Ser Gly Val Leu Gln Thr Gly Val Phe Ser Thr Glu
580 585 590

Asp Gly Phe Lys Tyr Phe Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu
595 600 605

Glu Gly Glu Ala Ile Asp Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn

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2013333532

610 615 620

Ile Tyr Tyr Phe Asp Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu
625 630 635 640

Leu Asp Gly Glu Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe
645 650 655

Lys Gly Leu Asn Gln Ile Gly Asp Tyr Lys Tyr Tyr Phe Asn Ser Asp
660 665 670

Gly Val Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr
675 680 685

Phe Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp Gly
690 695 700

Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val Phe
705 710 715 720

Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu Asp Leu
725 730 735

Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile Leu Asn Phe
740 745 750

Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr Ala Val Val Gly
755 760 765

Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr
770 775 780

Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile Asn Asp Gly Gln Tyr Tyr
785 790 795 800

Phe Asn Asp Asp Gly Ile Met Gln Val Gly Phe Val Thr Ile Asn Asp
805 810 815

Lys Val Phe Tyr Phe Ser Asp Ser Gly Ile Ile Glu Ser Gly Val Gln

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820 825 830

Asn Ile Asp Asp Asn Tyr Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln
835 840 845

Ile Gly Val Phe Asp Thr Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala
850 855 860

Asn Thr Val Asn Asp Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly
865 870 875 880

Leu Val Arg Val Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr
885 890 895

Ile Glu Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr
900 905 910

Tyr Phe Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile
915 920 925

Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly
930 935 940

Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly Glu
945 950 955 960

Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr Phe Gly
965 970 975

Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro Asp Gly Phe
980 985 990

Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu
995 1000 1005

Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp Glu Lys Arg Tyr
1010 1015 1020

Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly Ser Val Ile Ile

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1025 1030 1035

Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr Ala Gln Leu Val
1040 1045 1050

Ile Ser Glu
1055

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<211> 970
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Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
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Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr
20 25 30

Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn
35 40 45

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu
50 55 60

Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe Leu Thr Leu Asn Gly Lys
65 70 75 80

Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Trp Arg Ile
85 90 95

Ile Asn Asn Lys Lys Tyr Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala
100 105 110

Ile His Leu Cys Thr Ile Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp
115 120 125

Gly Ile Leu Gln Asn Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr
130 135 140

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```
Phe Asp Ala Asn Asn Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly
145                 150                 155                 160

Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn
                165                 170                 175

Ile Glu Gly Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn
            180                 185                 190

Gly Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp
        195                 200                 205

Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
    210                 215                 220

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
225                 230                 235                 240

Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys
                245                 250                 255

Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr Gly Tyr Thr
            260                 265                 270

Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln
        275                 280                 285

Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala
    290                 295                 300

Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn
305                 310                 315                 320

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser
                325                 330                 335

Lys Ala Val Thr Gly Leu Arg Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
            340                 345                 350
```

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```
Asn Thr Asn Thr Ala Val Ala Val Thr Gly Trp Gln Thr Ile Asn Gly
        355                 360                 365

Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr
    370                 375                 380

Thr Ile Ile Ser Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met
385                 390                 395                 400

Gln Ile Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro
                405                 410                 415

Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln
            420                 425                 430

Asn Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn
        435                 440                 445

Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr
    450                 455                 460

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile Asp
465                 470                 475                 480

Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly Val Phe
                485                 490                 495

Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala
            500                 505                 510

Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu His
        515                 520                 525

Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Val Thr
    530                 535                 540

Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr Tyr Phe Met Pro Asp Thr
545                 550                 555                 560
```

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Ala Met Ala Ala Ala Gly Gly Leu Phe Glu Ile Asp Gly Val Ile Tyr
565 570 575

Phe Phe Gly Val Asp Gly Val Lys Ala Pro Gly Ile Tyr Gly Gly Gly
580 585 590

Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe Asp Asp Ser Gly Val
595 600 605

Met Lys Val Gly Tyr Thr Glu Ile Asp Gly Lys His Phe Tyr Phe Ala
610 615 620

Glu Asn Gly Glu Met Gln Ile Gly Val Phe Asn Thr Glu Asp Gly Phe
625 630 635 640

Lys Tyr Phe Ala His His Asn Glu Asp Leu Gly Asn Glu Glu Gly Glu
645 650 655

Glu Ile Ser Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr
660 665 670

Phe Asp Asp Ser Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp
675 680 685

Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly
690 695 700

Leu Ser Leu Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile
705 710 715 720

Met Gln Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser
725 730 735

Asp Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
740 745 750

Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
755 760 765

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```
Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn
    770                 775                 780

Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val Gly Glu
785                 790                 795                 800

Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile
                805                 810                 815

Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asn Pro Glu Thr
            820                 825                 830

Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp Asp Ile Lys Tyr Tyr
        835                 840                 845

Phe Asp Glu Lys Gly Ile Met Arg Thr Gly Leu Ile Ser Phe Glu Asn
    850                 855                 860

Asn Asn Tyr Tyr Phe Asn Glu Asn Gly Glu Met Gln Phe Gly Tyr Ile
865                 870                 875                 880

Asn Ile Glu Asp Lys Met Phe Tyr Phe Gly Glu Asp Gly Val Met Gln
                885                 890                 895

Ile Gly Val Phe Asn Thr Pro Asp Gly Phe Lys Tyr Phe Ala His Gln
            900                 905                 910

Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly
        915                 920                 925

Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile
    930                 935                 940

Ala Ala Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp
945                 950                 955                 960

Pro Asp Thr Ala Gln Leu Val Ile Ser Glu
                965                 970
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<210> 192
<211> 1112
<212> PRT
<213> Clostridium difficile

<400> 192

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Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
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Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys His
            20                  25                  30

Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly
        35                  40                  45

Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn
    50                  55                  60

Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe Leu Thr Leu Asn
65                  70                  75                  80

Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Trp
                85                  90                  95

Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe Asn Pro Asn Asn Ala Ile
            100                 105                 110

Ala Ala Ile His Leu Cys Thr Ile Asn Asn Asp Lys Tyr Tyr Phe Ser
        115                 120                 125

Tyr Asp Gly Ile Leu Gln Asn Gly Tyr Ile Thr Ile Glu Arg Asn Asn
    130                 135                 140

Phe Tyr Phe Asp Ala Asn Asn Glu Ser Lys Met Val Thr Gly Val Phe
145                 150                 155                 160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn
                165                 170                 175
```

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```
Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr
            180                 185                 190

Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr
        195                 200                 205

Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr
    210                 215                 220

Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr
225                 230                 235                 240

Phe Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
                245                 250                 255

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr Gly
            260                 265                 270

Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile
        275                 280                 285

Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala
    290                 295                 300

Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr
305                 310                 315                 320

Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser
                325                 330                 335

Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile Asp Gly Lys Lys Tyr
            340                 345                 350

Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr Gly Trp Gln Thr Ile
        355                 360                 365

Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ser Ile Ala Ser Thr
    370                 375                 380
```

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```
Gly Tyr Thr Ile Ile Ser Gly Lys His Phe Tyr Phe Asn Thr Asp Gly
385                 390                 395                 400

Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe
                405                 410                 415

Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg
            420                 425                 430

Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly
        435                 440                 445

Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg
    450                 455                 460

Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr
465                 470                 475                 480

Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
                485                 490                 495

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
            500                 505                 510

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe
        515                 520                 525

Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala
    530                 535                 540

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr Tyr Phe Met Pro
545                 550                 555                 560

Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe Glu Ile Asp Gly Val
                565                 570                 575

Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala Pro Gly Ile Tyr Gly
            580                 585                 590
```

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```
Gly Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr Tyr Phe Asn Pro
        595                 600                 605

Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr Ile Ile Asp Asp Lys
    610                 615                 620

Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu Gln Thr Gly Val Phe Ser
625                 630                 635                 640

Thr Glu Asp Gly Phe Lys Tyr Phe Ala Pro Ala Asn Thr Leu Asp Glu
                645                 650                 655

Asn Leu Glu Gly Glu Ala Ile Asp Phe Thr Gly Lys Leu Ile Ile Asp
            660                 665                 670

Glu Asn Ile Tyr Tyr Phe Asp Asp Asn Tyr Arg Gly Ala Val Glu Trp
        675                 680                 685

Lys Glu Leu Asp Gly Glu Met His Tyr Phe Ser Pro Glu Thr Gly Lys
    690                 695                 700

Ala Phe Lys Gly Leu Asn Gln Ile Gly Asp Tyr Lys Tyr Tyr Phe Asn
705                 710                 715                 720

Ser Asp Gly Val Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys
                725                 730                 735

His Tyr Phe Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile
            740                 745                 750

Asp Gly Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly
        755                 760                 765

Val Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
    770                 775                 780

Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile Leu
785                 790                 795                 800
```

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```
Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr Ala Val
                805                 810                 815

Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr Phe Asp Glu
            820                 825                 830

Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile Asn Asp Gly Gln
        835                 840                 845

Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val Gly Phe Val Thr Ile
    850                 855                 860

Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser Gly Ile Ile Glu Ser Gly
865                 870                 875                 880

Val Gln Asn Ile Asp Asp Asn Tyr Phe Tyr Ile Asp Asp Asn Gly Ile
                885                 890                 895

Val Gln Ile Gly Val Phe Asp Thr Ser Asp Gly Tyr Lys Tyr Phe Ala
            900                 905                 910

Pro Ala Asn Thr Val Asn Asp Asn Ile Tyr Gly Gln Ala Val Glu Tyr
        915                 920                 925

Ser Gly Leu Val Arg Val Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr
    930                 935                 940

Tyr Thr Ile Glu Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp
945                 950                 955                 960

Lys Tyr Tyr Phe Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn
                965                 970                 975

Leu Ile Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg
            980                 985                 990

Thr Gly Leu Ile Ser Phe Glu Asn  Asn Asn Tyr Tyr Phe  Asn Glu Asn
        995                 1000                1005
```

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Gly Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe
1010 1015 1020

Tyr Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr
1025 1030 1035

Pro Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu
1040 1045 1050

Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu
1055 1060 1065

Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr
1070 1075 1080

Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp
1085 1090 1095

Thr Ala Gln Leu Val Ile Ser Glu His His His His His His
1100 1105 1110

<210> 193
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<212> PRT
<213> Clostridium difficile

<400> 193

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
1 5 10 15

Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys His
20 25 30

Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly
35 40 45

Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn
50 55 60

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```
Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe Leu Thr Leu Asn
65                  70                  75                  80

Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Trp
                85                  90                  95

Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe Asn Pro Asn Asn Ala Ile
            100                 105                 110

Ala Ala Ile His Leu Cys Thr Ile Asn Asn Asp Lys Tyr Tyr Phe Ser
        115                 120                 125

Tyr Asp Gly Ile Leu Gln Asn Gly Tyr Ile Thr Ile Glu Arg Asn Asn
    130                 135                 140

Phe Tyr Phe Asp Ala Asn Asn Glu Ser Lys Met Val Thr Gly Val Phe
145                 150                 155                 160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn
                165                 170                 175

Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr
            180                 185                 190

Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr
        195                 200                 205

Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr
    210                 215                 220

Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr
225                 230                 235                 240

Phe Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
                245                 250                 255

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr Gly
            260                 265                 270
```

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```
Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile
        275                 280                 285

Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala
    290                 295                 300

Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr
305                 310                 315                 320

Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser
                325                 330                 335

Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile Asp Gly Lys Lys Tyr
            340                 345                 350

Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr Gly Trp Gln Thr Ile
        355                 360                 365

Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ser Ile Ala Ser Thr
    370                 375                 380

Gly Tyr Thr Ile Ile Ser Gly Lys His Phe Tyr Phe Asn Thr Asp Gly
385                 390                 395                 400

Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe
                405                 410                 415

Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg
            420                 425                 430

Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly
        435                 440                 445

Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg
    450                 455                 460

Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr
465                 470                 475                 480
```

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```
Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
                485                 490                 495

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
            500                 505                 510

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe
        515                 520                 525

Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala
    530                 535                 540

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr Tyr Phe Met Pro
545                 550                 555                 560

Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe Glu Ile Asp Gly Val
                565                 570                 575

Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala Val Thr Gly Phe Val
            580                 585                 590

Thr Val Gly Asp Asp Lys Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala
        595                 600                 605

Ala Ser Ile Gly Glu Thr Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn
    610                 615                 620

Gln Ser Gly Val Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe
625                 630                 635                 640

Lys Tyr Phe Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu
                645                 650                 655

Ala Ile Asp Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr
            660                 665                 670

Phe Asp Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly
        675                 680                 685
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```
Glu Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
    690                 695                 700

Asn Gln Ile Gly Asp Tyr Lys Tyr Tyr Phe Asn Ser Asp Gly Val Met
705                 710                 715                 720

Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe Asp Asp
                725                 730                 735

Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp Gly Lys His Phe
            740                 745                 750

Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val Phe Asn Thr Glu
        755                 760                 765

Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu Asp Leu Gly Asn Glu
    770                 775                 780

Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys
785                 790                 795                 800

Ile Tyr Tyr Phe Asp Asp Ser Phe Thr Ala Val Val Gly Trp Lys Asp
                805                 810                 815

Leu Glu Asp Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala
            820                 825                 830

Tyr Ile Gly Leu Ser Leu Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp
        835                 840                 845

Asp Gly Ile Met Gln Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe
    850                 855                 860

Tyr Phe Ser Asp Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp
865                 870                 875                 880

Asp Asn Tyr Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val
                885                 890                 895
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```
Phe Asp Thr Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val
            900                 905                 910

Asn Asp Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg
        915                 920                 925

Val Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
    930                 935                 940

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asn
945                 950                 955                 960

Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp Asp Ile
                965                 970                 975

Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly Leu Ile Ser
            980                 985                 990

Phe Glu Asn Asn Asn Tyr Tyr Phe  Asn Glu Asn Gly Glu  Met Gln Phe
        995                 1000                1005

Gly Tyr  Ile Asn Ile Glu Asp  Lys Met Phe Tyr Phe  Gly Glu Asp
    1010                1015                1020

Gly Val  Met Gln Ile Gly Val  Phe Asn Thr Pro Asp  Gly Phe Lys
    1025                1030                1035

Tyr Phe  Ala His Gln Asn Thr  Leu Asp Glu Asn Phe  Glu Gly Glu
    1040                1045                1050

Ser Ile  Asn Tyr Thr Gly Trp  Leu Asp Leu Asp Glu  Lys Arg Tyr
    1055                1060                1065

Tyr Phe  Thr Asp Glu Tyr Ile  Ala Ala Thr Gly Ser  Val Ile Ile
    1070                1075                1080

Asp Gly  Glu Glu Tyr Tyr Phe  Asp Pro Asp Thr Ala  Gln Leu Val
    1085                1090                1095
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Ile Ser Glu His His His His His His
1100 1105

<210> 194
<211> 1128
<212> PRT
<213> Clostridium difficile

<400> 194

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
1 5 10 15

Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys His
20 25 30

Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly
35 40 45

Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn
50 55 60

Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe Leu Thr Leu Asn
65 70 75 80

Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Trp
85 90 95

Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe Asn Pro Asn Asn Ala Ile
100 105 110

Ala Ala Ile His Leu Cys Thr Ile Asn Asn Asp Lys Tyr Tyr Phe Ser
115 120 125

Tyr Asp Gly Ile Leu Gln Asn Gly Tyr Ile Thr Ile Glu Arg Asn Asn
130 135 140

Phe Tyr Phe Asp Ala Asn Asn Glu Ser Lys Met Val Thr Gly Val Phe
145 150 155 160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn

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165 170 175

Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr
180 185 190

Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr
195 200 205

Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr
210 215 220

Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr
225 230 235 240

Phe Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
245 250 255

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr Gly
260 265 270

Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile
275 280 285

Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala
290 295 300

Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr
305 310 315 320

Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser
325 330 335

Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile Asp Gly Lys Lys Tyr
340 345 350

Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr Gly Trp Gln Thr Ile
355 360 365

Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ser Ile Ala Ser Thr

370 375 380

Gly Tyr Thr Ile Ile Ser Gly Lys His Phe Tyr Phe Asn Thr Asp Gly
385 390 395 400

Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe
405 410 415

Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg
420 425 430

Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly
435 440 445

Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg
450 455 460

Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr
465 470 475 480

Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
485 490 495

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
500 505 510

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe
515 520 525

Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala
530 535 540

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr Tyr Phe Met Pro
545 550 555 560

Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe Glu Ile Asp Gly Val
565 570 575

Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala Val Ser Gly Leu Ile

580 585 590

Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val Asn Asn Leu
595 600 605

Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr Tyr Phe Asn Pro
610 615 620

Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr Ile Ile Asp Asp Lys
625 630 635 640

Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu Gln Thr Gly Val Phe Ser
645 650 655

Thr Glu Asp Gly Phe Lys Tyr Phe Ala Pro Ala Asn Thr Leu Asp Glu
660 665 670

Asn Leu Glu Gly Glu Ala Ile Asp Phe Thr Gly Lys Leu Ile Ile Asp
675 680 685

Glu Asn Ile Tyr Tyr Phe Asp Asp Asn Tyr Arg Gly Ala Val Glu Trp
690 695 700

Lys Glu Leu Asp Gly Glu Met His Tyr Phe Ser Pro Glu Thr Gly Lys
705 710 715 720

Ala Phe Lys Gly Leu Asn Gln Ile Gly Asp Tyr Lys Tyr Tyr Phe Asn
725 730 735

Ser Asp Gly Val Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys
740 745 750

His Tyr Phe Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile
755 760 765

Asp Gly Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly
770 775 780

Val Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu

785 790 795 800

Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile Leu
805 810 815

Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr Ala Val
820 825 830

Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr Phe Asp Glu
835 840 845

Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile Asn Asp Gly Gln
850 855 860

Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val Gly Phe Val Thr Ile
865 870 875 880

Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser Gly Ile Ile Glu Ser Gly
885 890 895

Val Gln Asn Ile Asp Asp Asn Tyr Phe Tyr Ile Asp Asp Asn Gly Ile
900 905 910

Val Gln Ile Gly Val Phe Asp Thr Ser Asp Gly Tyr Lys Tyr Phe Ala
915 920 925

Pro Ala Asn Thr Val Asn Asp Asn Ile Tyr Gly Gln Ala Val Glu Tyr
930 935 940

Ser Gly Leu Val Arg Val Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr
945 950 955 960

Tyr Thr Ile Glu Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp
965 970 975

Lys Tyr Tyr Phe Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn
980 985 990

Leu Ile Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg

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995 1000 1005

Thr Gly Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu
1010 1015 1020

Asn Gly Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met
1025 1030 1035

Phe Tyr Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn
1040 1045 1050

Thr Pro Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp
1055 1060 1065

Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp
1070 1075 1080

Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala
1085 1090 1095

Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro
1100 1105 1110

Asp Thr Ala Gln Leu Val Ile Ser Glu His His His His His His
1115 1120 1125

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<400> 195

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
1 5 10 15

Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys His
20 25 30

Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly
35 40 45

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Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn
    50                  55                  60

Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe Leu Thr Leu Asn
65                  70                  75                  80

Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Trp
                85                  90                  95

Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe Asn Pro Asn Asn Ala Ile
            100                 105                 110

Ala Ala Ile His Leu Cys Thr Ile Asn Asn Asp Lys Tyr Tyr Phe Ser
        115                 120                 125

Tyr Asp Gly Ile Leu Gln Asn Gly Tyr Ile Thr Ile Glu Arg Asn Asn
    130                 135                 140

Phe Tyr Phe Asp Ala Asn Asn Glu Ser Lys Met Val Thr Gly Val Phe
145                 150                 155                 160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn
                165                 170                 175

Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr
            180                 185                 190

Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr
        195                 200                 205

Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr
    210                 215                 220

Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr
225                 230                 235                 240

Phe Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
                245                 250                 255
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Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr Gly
            260                 265                 270

Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile
        275                 280                 285

Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala
    290                 295                 300

Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr
305                 310                 315                 320

Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser
                325                 330                 335

Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile Asp Gly Lys Lys Tyr
            340                 345                 350

Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr Gly Trp Gln Thr Ile
        355                 360                 365

Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ser Ile Ala Ser Thr
    370                 375                 380

Gly Tyr Thr Ile Ile Ser Gly Lys His Phe Tyr Phe Asn Thr Asp Gly
385                 390                 395                 400

Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe
                405                 410                 415

Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg
            420                 425                 430

Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly
        435                 440                 445

Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg
    450                 455                 460
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Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr
465                 470                 475                 480

Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
                485                 490                 495

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
            500                 505                 510

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe
        515                 520                 525

Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala
    530                 535                 540

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr Tyr Phe Met Pro
545                 550                 555                 560

Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe Glu Ile Asp Gly Val
                565                 570                 575

Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala Val Lys Gly Leu Asn
            580                 585                 590

Gln Ile Gly Asp Tyr Lys Tyr Tyr Phe Asn Ser Asp Gly Val Met Gln
        595                 600                 605

Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe Asp Asp Ser
    610                 615                 620

Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp Gly Lys His Phe Tyr
625                 630                 635                 640

Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val Phe Asn Thr Glu Asp
                645                 650                 655

Gly Phe Lys Tyr Phe Ala His His Asn Glu Asp Leu Gly Asn Glu Glu
            660                 665                 670
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Gly Glu Glu Ile Ser Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile
        675                 680                 685

Tyr Tyr Phe Asp Asp Ser Phe Thr Ala Val Val Gly Trp Lys Asp Leu
    690                 695                 700

Glu Asp Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr
705                 710                 715                 720

Ile Gly Leu Ser Leu Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp
                725                 730                 735

Gly Ile Met Gln Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr
            740                 745                 750

Phe Ser Asp Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp
        755                 760                 765

Asn Tyr Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe
    770                 775                 780

Asp Thr Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn
785                 790                 795                 800

Asp Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
                805                 810                 815

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly
            820                 825                 830

Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asn Pro
        835                 840                 845

Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp Asp Ile Lys
    850                 855                 860

Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly Leu Ile Ser Phe
865                 870                 875                 880
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Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly Glu Met Gln Phe Gly
885 890 895

Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr Phe Gly Glu Asp Gly Val
900 905 910

Met Gln Ile Gly Val Phe Asn Thr Pro Asp Gly Phe Lys Tyr Phe Ala
915 920 925

His Gln Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr
930 935 940

Thr Gly Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu
945 950 955 960

Tyr Ile Ala Ala Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr
965 970 975

Phe Asp Pro Asp Thr Ala Gln Leu Val Ile Ser Glu His His His His
980 985 990

His His

<210> 196
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<213> Clostridium difficile

<400> 196

Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1 5 10 15

Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
20 25 30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
35 40 45

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```
Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn
    50                  55                  60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65                  70                  75                  80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
            100                 105                 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Val Lys Leu
        115                 120                 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
    130                 135                 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255
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```
Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
    290                 295                 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
                325                 330                 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
            340                 345                 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
        355                 360                 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
    370                 375                 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385                 390                 395                 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
                405                 410                 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
            420                 425                 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
        435                 440                 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
    450                 455                 460
```

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```
Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465                 470                 475                 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
                485                 490                 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
            500                 505                 510

Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
        515                 520                 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
    530                 535                 540

Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545                 550                 555                 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
                565                 570                 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
            580                 585                 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
        595                 600                 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
    610                 615                 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625                 630                 635                 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
                645                 650                 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
            660                 665                 670
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Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
675 680 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
690 695 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705 710 715 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser
725 730 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
740 745 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
755 760 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
770 775 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785 790 795 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
805 810 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
820 825 830

Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
835 840 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
850 855 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865 870 875 880

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```
Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
                885                 890                 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
            900                 905                 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
        915                 920                 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
    930                 935                 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945                 950                 955                 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
                965                 970                 975

Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
            980                 985                 990

Ala Gln Leu Phe Ser Thr Gly Leu  Asn Thr Ile Tyr Asp  Ser Ile Gln
        995                 1000                1005

Leu Val  Asn Leu Ile Ser Asn  Ala Val Asn Asp Thr  Ile Asn Val
    1010                1015                1020

Leu Pro  Thr Ile Thr Glu Gly  Ile Pro Ile Val Ser  Thr Ile Leu
    1025                1030                1035

Asp Gly  Ile Asn Leu Gly Ala  Ala Ile Lys Glu Leu  Leu Asp Glu
    1040                1045                1050

His Asp  Pro Leu Leu Lys Lys  Glu Leu Glu Ala Lys  Val Gly Val
    1055                1060                1065

Leu Ala  Ile Asn Met Ser Leu  Ser Ile Ala Ala Thr  Val Ala Ser
    1070                1075                1080
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```
Ile Val  Gly Ile Gly Ala Glu  Val Thr Ile Phe Leu  Leu Pro Ile
    1085                1090                1095

Ala Gly  Ile Ser Ala Gly Ile  Pro Ser Leu Val Asn  Asn Glu Leu
    1100                1105                1110

Ile Leu  His Asp Lys Ala Thr  Ser Val Val Asn Tyr  Phe Asn His
    1115                1120                1125

Leu Ser  Glu Ser Lys Lys Tyr  Gly Pro Leu Lys Thr  Glu Asp Asp
    1130                1135                1140

Lys Ile  Leu Val Pro Ile Asp  Asp Leu Val Ile Ser  Glu Ile Asp
    1145                1150                1155

Phe Asn  Asn Asn Ser Ile Lys  Leu Gly Thr Cys Asn  Ile Leu Ala
    1160                1165                1170

Met Glu  Gly Gly Ser Gly His  Thr Val Thr Gly Asn  Ile Asp His
    1175                1180                1185

Phe Phe  Ser Ser Pro Tyr Ile  Ser Ser His Ile Pro  Ser Leu Ser
    1190                1195                1200

Val Tyr  Ser Ala Ile Gly Ile  Lys Thr Glu Asn Leu  Asp Phe Ser
    1205                1210                1215

Lys Lys  Ile Met Met Leu Pro  Asn Ala Pro Ser Arg  Val Phe Trp
    1220                1225                1230

Trp Glu  Thr Gly Ala Val Pro  Gly Leu Arg Ser Leu  Glu Asn Asp
    1235                1240                1245

Gly Thr  Lys Leu Leu Asp Ser  Ile Arg Asp Leu Tyr  Pro Gly Lys
    1250                1255                1260

Phe Tyr  Trp Arg Phe Tyr Ala  Phe Phe Asp Tyr Ala  Ile Thr Thr
    1265                1270                1275
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```
Leu Lys  Pro Val Tyr Glu Asp  Thr Asn Thr Lys Ile  Lys Leu Asp
    1280                1285                1290

Lys Asp  Thr Arg Asn Phe Ile  Met Pro Thr Ile Thr  Thr Asp Glu
    1295                1300                1305

Ile Arg  Asn Lys Leu Ser Tyr  Ser Phe Asp Gly Ala  Gly Gly Thr
    1310                1315                1320

Tyr Ser  Leu Leu Leu Ser Ser  Tyr Pro Ile Ser Met  Asn Ile Asn
    1325                1330                1335

Leu Ser  Lys Asp Asp Leu Trp  Ile Phe Asn Ile Asp  Asn Glu Val
    1340                1345                1350

Arg Glu  Ile Ser Ile Glu Asn  Gly Thr Ile Lys Lys  Gly Asn Leu
    1355                1360                1365

Ile Glu  Asp Val Leu Ser Lys  Ile Asp Ile Asn Lys  Asn Lys Leu
    1370                1375                1380

Ile Ile  Gly Asn Gln Thr Ile  Asp Phe Ser Gly Asp  Ile Asp Asn
    1385                1390                1395

Lys Asp  Arg Tyr Ile Phe Leu  Thr Cys Glu Leu Asp  Asp Lys Ile
    1400                1405                1410

Ser Leu  Ile Ile Glu Ile Asn  Leu Val Ala Lys Ser  Tyr Ser Leu
    1415                1420                1425

Leu Leu  Ser Gly Asp Lys Asn  Tyr Leu Ile Ser Asn  Leu Ser Asn
    1430                1435                1440

Thr Ile  Glu Lys Ile Asn Thr  Leu Gly Leu Asp Ser  Lys Asn Ile
    1445                1450                1455

Ala Tyr  Asn Tyr Thr Asp Glu  Ser Asn Asn Lys Tyr  Phe Gly Ala
    1460                1465                1470
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Ile Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp
1475 1480 1485

Ser Lys Asn Ile Leu Glu Phe Tyr Asn Gly Ser Thr Leu Glu Phe
1490 1495 1500

Asn Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys
1505 1510 1515

Asp Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn
1520 1525 1530

Thr Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn
1535 1540 1545

Gln Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser
1550 1555 1560

Ser Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr
1565 1570 1575

Ser Asn Phe Met Asn Leu Phe Leu Asn Asn Ile Ser Phe Trp Lys
1580 1585 1590

Leu Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe
1595 1600 1605

Thr Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys
1610 1615 1620

Asp Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr
1625 1630 1635

Ser Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val
1640 1645 1650

Val Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser
1655 1660 1665

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Thr Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg
1670 1675 1680

Tyr Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu
1685 1690 1695

Ile Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu
1700 1705 1710

Ile Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile
1715 1720 1725

Asn Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly
1730 1735 1740

Ser Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys
1745 1750 1755

Ile Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln
1760 1765 1770

Ser Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu
1775 1780 1785

Ser Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu
1790 1795 1800

Asn Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn
1805 1810 1815

Lys Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu
1820 1825 1830

Ile Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Ser
1835 1840 1845

Asn Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr
1850 1855 1860

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```
Phe Asp  Ile Asn Thr Gly Ala  Ala Ser Thr Ser Tyr  Lys Ile Ile
    1865                1870                1875

Asn Gly  Lys His Phe Tyr Phe  Asn Asn Asn Gly Val  Met Gln Leu
    1880                1885                1890

Gly Val  Phe Lys Gly Pro Asp  Gly Phe Glu Tyr Phe  Ala Pro Ala
    1895                1900                1905

Asn Thr  Gln Asn Asn Asn Ile  Glu Gly Gln Ala Ile  Val Tyr Gln
    1910                1915                1920

Ser Lys  Phe Leu Thr Leu Asn  Gly Lys Lys Tyr Tyr  Phe Asp Asn
    1925                1930                1935

Asp Ser  Lys Ala Val Thr Gly  Trp Arg Ile Ile Asn  Asn Glu Lys
    1940                1945                1950

Tyr Tyr  Phe Asn Pro Asn Asn  Ala Ile Ala Ala Val  Gly Leu Gln
    1955                1960                1965

Val Ile  Asp Asn Asn Lys Tyr  Tyr Phe Asn Pro Asp  Thr Ala Ile
    1970                1975                1980

Ile Ser  Lys Gly Trp Gln Thr  Val Asn Gly Ser Arg  Tyr Tyr Phe
    1985                1990                1995

Asp Thr  Asp Thr Ala Ile Ala  Phe Asn Gly Tyr Lys  Thr Ile Asp
    2000                2005                2010

Gly Lys  His Phe Tyr Phe Asp  Ser Asp Cys Val Val  Lys Ile Gly
    2015                2020                2025

Val Phe  Ser Gly Ser Asn Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2030                2035                2040

Thr Tyr  Asn Asn Asn Ile Glu  Gly Gln Ala Ile Val  Tyr Gln Ser
    2045                2050                2055
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Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
2060 2065 2070

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr
2075 2080 2085

Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr
2090 2095 2100

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala
2105 2110 2115

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2120 2125 2130

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
2135 2140 2145

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2150 2155 2160

Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2165 2170 2175

His Asn Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Lys
2180 2185 2190

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser
2195 2200 2205

Lys Ala Ile Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Asn Asn Ala Ile Ala Ala Thr His Leu Cys Thr Ile
2225 2230 2235

Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn
2240 2245 2250

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Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn
2255 2260 2265

Asn Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly
2270 2275 2280

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu
2285 2290 2295

Gly Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly
2300 2305 2310

Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp
2315 2320 2325

Gln Thr Ile Asp Ser Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala
2330 2335 2340

Val Ala Val Thr Gly Trp Gln Thr Ile Asp Gly Glu Lys Tyr Tyr
2345 2350 2355

Phe Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2360 2365 2370

Asp Gly Lys Arg Tyr Tyr Phe Asn Thr Asn Thr Tyr Ile Ala Ser
2375 2380 2385

Thr Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr Phe Asn Thr
2390 2395 2400

Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly Phe
2405 2410 2415

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2420 2425 2430

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2435 2440 2445

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Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg
2450 2455 2460

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val
2465 2470 2475

Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
2480 2485 2490

Asn Thr Asn Thr Tyr Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser
2495 2500 2505

Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly
2510 2515 2520

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2525 2530 2535

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2540 2545 2550

Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asp
2555 2560 2565

Ser Lys Ala Ala Thr Gly Trp Ala Thr Ile Asp Gly Asn Arg Tyr
2570 2575 2580

Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr
2585 2590 2595

Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile
2600 2605 2610

Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala
2615 2620 2625

Asn Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg Tyr Gln
2630 2635 2640

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Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Ser Lys Val
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly
2705 2710

<210> 197
<211> 2710
<212> PRT
<213> Clostridium difficile

<400> 197

Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1 5 10 15

Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
20 25 30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
35 40 45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn
50 55 60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65 70 75 80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
85 90 95

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```
Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
            100                 105                 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
        115                 120                 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
    130                 135                 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Pro Arg Pro Ser
    290                 295                 300
```

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```
Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
                325                 330                 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
            340                 345                 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
        355                 360                 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
    370                 375                 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385                 390                 395                 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
                405                 410                 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
            420                 425                 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
        435                 440                 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
    450                 455                 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465                 470                 475                 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
                485                 490                 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
            500                 505                 510
```

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```
Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
        515                 520                 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
    530                 535                 540

Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545                 550                 555                 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
                565                 570                 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
            580                 585                 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
        595                 600                 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
    610                 615                 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625                 630                 635                 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
                645                 650                 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
            660                 665                 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
        675                 680                 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
    690                 695                 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705                 710                 715                 720
```

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```
Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser
                725                 730                 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
            740                 745                 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
        755                 760                 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
    770                 775                 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785                 790                 795                 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
                805                 810                 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
            820                 825                 830

Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
        835                 840                 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
    850                 855                 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865                 870                 875                 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
                885                 890                 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
            900                 905                 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
        915                 920                 925
```

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```
Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
    930                 935                 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945                 950                 955                 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
                965                 970                 975

Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
            980                 985                 990

Ala Gln Leu Phe Ser Thr Gly Leu  Asn Thr Ile Tyr Asp  Ser Ile Gln
        995                 1000                1005

Leu Val  Asn Leu Ile Ser Asn  Ala Val Asn Asp Thr  Ile Asn Val
    1010                1015                1020

Leu Pro  Thr Ile Thr Glu Gly  Ile Pro Ile Val Ser  Thr Ile Leu
    1025                1030                1035

Asp Gly  Ile Asn Leu Gly Ala  Ala Ile Lys Glu Leu  Leu Asp Glu
    1040                1045                1050

His Asp  Pro Leu Leu Lys Lys  Glu Leu Glu Ala Lys  Val Gly Val
    1055                1060                1065

Leu Ala  Ile Asn Met Ser Leu  Ser Ile Ala Ala Thr  Val Ala Ser
    1070                1075                1080

Ile Val  Gly Ile Gly Ala Glu  Val Thr Ile Phe Leu  Leu Pro Ile
    1085                1090                1095

Ala Gly  Ile Ser Ala Gly Ile  Pro Ser Leu Val Asn  Asn Glu Leu
    1100                1105                1110

Ile Leu  His Asp Lys Ala Thr  Ser Val Val Asn Tyr  Phe Asn His
    1115                1120                1125
```

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Leu Ser Glu Ser Lys Glu Tyr Gly Pro Leu Lys Thr Glu Asp Asp
1130 1135 1140

Lys Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp
1145 1150 1155

Phe Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala
1160 1165 1170

Met Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His
1175 1180 1185

Phe Phe Ser Ser Pro Tyr Ile Ser Ser His Ile Pro Ser Leu Ser
1190 1195 1200

Val Tyr Ser Ala Ile Gly Ile Lys Thr Glu Asn Leu Asp Phe Ser
1205 1210 1215

Lys Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp
1220 1225 1230

Trp Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asn
1235 1240 1245

Gly Thr Lys Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys
1250 1255 1260

Phe Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr
1265 1270 1275

Leu Lys Pro Val Tyr Glu Asp Thr Asn Thr Lys Ile Lys Leu Asp
1280 1285 1290

Lys Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asp Glu
1295 1300 1305

Ile Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr
1310 1315 1320

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```
Tyr Ser  Leu Leu Leu Ser Ser  Tyr Pro Ile Ser Met  Asn Ile Asn
    1325                1330                1335

Leu Ser  Lys Asp Asp Leu Trp  Ile Phe Asn Ile Asp  Asn Glu Val
    1340                1345                1350

Arg Glu  Ile Ser Ile Glu Asn  Gly Thr Ile Lys Lys  Gly Asn Leu
    1355                1360                1365

Ile Glu  Asp Val Leu Ser Lys  Ile Asp Ile Asn Lys  Asn Lys Leu
    1370                1375                1380

Ile Ile  Gly Asn Gln Thr Ile  Asp Phe Ser Gly Asp  Ile Asp Asn
    1385                1390                1395

Lys Asp  Arg Tyr Ile Phe Leu  Thr Cys Glu Leu Asp  Asp Lys Ile
    1400                1405                1410

Ser Leu  Ile Ile Glu Ile Asn  Leu Val Ala Lys Ser  Tyr Ser Leu
    1415                1420                1425

Leu Leu  Ser Gly Asp Lys Asn  Tyr Leu Ile Ser Asn  Leu Ser Asn
    1430                1435                1440

Thr Ile  Glu Lys Ile Asn Thr  Leu Gly Leu Asp Ser  Lys Asn Ile
    1445                1450                1455

Ala Tyr  Asn Tyr Thr Asp Glu  Ser Asn Asn Lys Tyr  Phe Gly Ala
    1460                1465                1470

Ile Ser  Lys Thr Ser Gln Lys  Ser Ile Ile His Tyr  Lys Lys Asp
    1475                1480                1485

Ser Lys  Asn Ile Leu Glu Phe  Tyr Asn Gly Ser Thr  Leu Glu Phe
    1490                1495                1500

Asn Ser  Lys Asp Phe Ile Ala  Glu Asp Ile Asn Val  Phe Met Lys
    1505                1510                1515
```

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```
Asp Asp  Ile Asn Thr Ile Thr  Gly Lys Tyr Tyr Val  Asp Asn Asn
    1520                1525                1530

Thr Asp  Lys Ser Ile Asp Phe  Ser Ile Ser Leu Val  Ser Lys Asn
    1535                1540                1545

Gln Val  Lys Val Asn Gly Leu  Tyr Leu Asn Glu Ser  Val Tyr Ser
    1550                1555                1560

Ser Tyr  Leu Asp Phe Val Lys  Asn Ser Asp Gly His  His Asn Thr
    1565                1570                1575

Ser Asn  Phe Met Asn Leu Phe  Leu Asn Asn Ile Ser  Phe Trp Lys
    1580                1585                1590

Leu Phe  Gly Phe Glu Asn Ile  Asn Phe Val Ile Asp  Lys Tyr Phe
    1595                1600                1605

Thr Leu  Val Gly Lys Thr Asn  Leu Gly Tyr Val Glu  Phe Ile Cys
    1610                1615                1620

Asp Asn  Asn Lys Asn Ile Asp  Ile Tyr Phe Gly Glu  Trp Lys Thr
    1625                1630                1635

Ser Ser  Ser Lys Ser Thr Ile  Phe Ser Gly Asn Gly  Arg Asn Val
    1640                1645                1650

Val Val  Glu Pro Ile Tyr Asn  Pro Asp Thr Gly Glu  Asp Ile Ser
    1655                1660                1665

Thr Ser  Leu Asp Phe Ser Tyr  Glu Pro Leu Tyr Gly  Ile Asp Arg
    1670                1675                1680

Tyr Ile  Asn Lys Val Leu Ile  Ala Pro Asp Leu Tyr  Thr Ser Leu
    1685                1690                1695

Ile Asn  Ile Asn Thr Asn Tyr  Tyr Ser Asn Glu Tyr  Tyr Pro Glu
    1700                1705                1710
```

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Ile Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile
1715 1720 1725

Asn Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly
1730 1735 1740

Ser Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys
1745 1750 1755

Ile Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln
1760 1765 1770

Ser Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu
1775 1780 1785

Ser Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu
1790 1795 1800

Asn Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn
1805 1810 1815

Lys Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu
1820 1825 1830

Ile Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Ser
1835 1840 1845

Asn Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr
1850 1855 1860

Phe Asp Ile Asn Thr Gly Ala Ala Ser Thr Ser Tyr Lys Ile Ile
1865 1870 1875

Asn Gly Lys His Phe Tyr Phe Asn Asn Asn Gly Val Met Gln Leu
1880 1885 1890

Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala
1895 1900 1905

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```
Asn Thr  Gln Asn Asn Asn Ile  Glu Gly Gln Ala Ile  Val Tyr Gln
    1910                1915                1920

Ser Lys  Phe Leu Thr Leu Asn  Gly Lys Lys Tyr Tyr  Phe Asp Asn
    1925                1930                1935

Asp Ser  Lys Ala Val Thr Gly  Trp Arg Ile Ile Asn  Asn Glu Lys
    1940                1945                1950

Tyr Tyr  Phe Asn Pro Asn Asn  Ala Ile Ala Ala Val  Gly Leu Gln
    1955                1960                1965

Val Ile  Asp Asn Asn Lys Tyr  Tyr Phe Asn Pro Asp  Thr Ala Ile
    1970                1975                1980

Ile Ser  Lys Gly Trp Gln Thr  Val Asn Gly Ser Arg  Tyr Tyr Phe
    1985                1990                1995

Asp Thr  Asp Thr Ala Ile Ala  Phe Asn Gly Tyr Lys  Thr Ile Asp
    2000                2005                2010

Gly Lys  His Phe Tyr Phe Asp  Ser Asp Cys Val Val  Lys Ile Gly
    2015                2020                2025

Val Phe  Ser Gly Ser Asn Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2030                2035                2040

Thr Tyr  Asn Asn Asn Ile Glu  Gly Gln Ala Ile Val  Tyr Gln Ser
    2045                2050                2055

Lys Phe  Leu Thr Leu Asn Gly  Lys Lys Tyr Tyr Phe  Asp Asn Asn
    2060                2065                2070

Ser Lys  Ala Val Thr Gly Trp  Gln Thr Ile Asp Ser  Lys Lys Tyr
    2075                2080                2085

Tyr Phe  Asn Thr Asn Thr Ala  Glu Ala Ala Thr Gly  Trp Gln Thr
    2090                2095                2100
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Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala
2105 2110 2115

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2120 2125 2130

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
2135 2140 2145

Lys Tyr Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2150 2155 2160

Phe Lys Val Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2165 2170 2175

His Asn Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Lys
2180 2185 2190

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser
2195 2200 2205

Lys Ala Ile Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Asn Asn Ala Ile Ala Ala Thr His Leu Cys Thr Ile
2225 2230 2235

Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn
2240 2245 2250

Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn
2255 2260 2265

Asn Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly
2270 2275 2280

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu
2285 2290 2295

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```
Gly Gln  Ala Ile Val Tyr Gln  Asn Lys Phe Leu Thr  Leu Asn Gly
    2300                2305                2310

Lys Lys  Tyr Tyr Phe Asp Asn  Asp Ser Lys Ala Val  Thr Gly Trp
    2315                2320                2325

Gln Thr  Ile Asp Ser Lys Lys  Tyr Tyr Phe Asn Leu  Asn Thr Ala
    2330                2335                2340

Val Ala  Val Thr Gly Trp Gln  Thr Ile Asp Gly Glu  Lys Tyr Tyr
    2345                2350                2355

Phe Asn  Leu Asn Thr Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile
    2360                2365                2370

Asp Gly  Lys Arg Tyr Tyr Phe  Asn Thr Asn Thr Tyr  Ile Ala Ser
    2375                2380                2385

Thr Gly  Tyr Thr Ile Ile Asn  Gly Lys His Phe Tyr  Phe Asn Thr
    2390                2395                2400

Asp Gly  Ile Met Gln Ile Gly  Val Phe Lys Gly Pro  Asp Gly Phe
    2405                2410                2415

Glu Tyr  Phe Ala Pro Ala Asn  Thr His Asn Asn Asn  Ile Glu Gly
    2420                2425                2430

Gln Ala  Ile Leu Tyr Gln Asn  Lys Phe Leu Thr Leu  Asn Gly Lys
    2435                2440                2445

Lys Tyr  Tyr Phe Gly Ser Asp  Ser Lys Ala Val Thr  Gly Leu Arg
    2450                2455                2460

Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn Thr Asn  Thr Ala Val
    2465                2470                2475

Ala Val  Thr Gly Trp Gln Thr  Ile Asn Gly Lys Lys  Tyr Tyr Phe
    2480                2485                2490
```

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```
Asn Thr  Asn Thr Tyr Ile Ala  Ser Thr Gly Tyr Thr  Ile Ile Ser
    2495                 2500                 2505

Gly Lys  His Phe Tyr Phe Asn  Thr Asp Gly Ile Met  Gln Ile Gly
    2510                 2515                 2520

Val Phe  Lys Gly Pro Asp Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2525                 2530                 2535

Thr Asp  Ala Asn Asn Ile Glu  Gly Gln Ala Ile Arg  Tyr Gln Asn
    2540                 2545                 2550

Arg Phe  Leu Tyr Leu His Asp  Asn Ile Tyr Tyr Phe  Gly Asn Asp
    2555                 2560                 2565

Ser Lys  Ala Ala Thr Gly Trp  Ala Thr Ile Asp Gly  Asn Arg Tyr
    2570                 2575                 2580

Tyr Phe  Glu Pro Asn Thr Ala  Met Gly Ala Asn Gly  Tyr Lys Thr
    2585                 2590                 2595

Ile Asp  Asn Lys Asn Phe Tyr  Phe Arg Asn Gly Leu  Pro Gln Ile
    2600                 2605                 2610

Gly Val  Phe Lys Gly Pro Asn  Gly Phe Glu Tyr Phe  Ala Pro Ala
    2615                 2620                 2625

Asn Thr  Asp Ala Asn Asn Ile  Asp Gly Gln Ala Ile  Arg Tyr Gln
    2630                 2635                 2640

Asn Arg  Phe Leu His Leu Leu  Gly Lys Ile Tyr Tyr  Phe Gly Asn
    2645                 2650                 2655

Asn Ser  Lys Ala Val Thr Gly  Trp Gln Thr Ile Asn  Ser Lys Val
    2660                 2665                 2670

Tyr Tyr  Phe Met Pro Asp Thr  Ala Met Ala Ala Ala  Gly Gly Leu
    2675                 2680                 2685
```

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Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly
2705 2710

<210> 198
<211> 2710
<212> PRT
<213> Clostridium difficile

<400> 198

Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1 5 10 15

Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
20 25 30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
35 40 45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr
50 55 60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65 70 75 80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
100 105 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
115 120 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
130 135 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile

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145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
    290                 295                 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
                325                 330                 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
            340                 345                 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
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        355                 360                 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
    370                 375                 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385                 390                 395                 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
                405                 410                 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
            420                 425                 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
        435                 440                 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
    450                 455                 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465                 470                 475                 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
                485                 490                 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
            500                 505                 510

Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
        515                 520                 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
    530                 535                 540

Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545                 550                 555                 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
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565 570 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
580 585 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
595 600 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
610 615 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625 630 635 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
645 650 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
660 665 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
675 680 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
690 695 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705 710 715 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser
725 730 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
740 745 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
755 760 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser

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770 775 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785 790 795 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
805 810 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
820 825 830

Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
835 840 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
850 855 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865 870 875 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
885 890 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
900 905 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
915 920 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
930 935 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945 950 955 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
965 970 975

Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr

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980 985 990

Ala Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln
995 1000 1005

Leu Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val
1010 1015 1020

Leu Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu
1025 1030 1035

Asp Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu
1040 1045 1050

His Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val
1055 1060 1065

Leu Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser
1070 1075 1080

Ile Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile
1085 1090 1095

Ala Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu
1100 1105 1110

Ile Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His
1115 1120 1125

Leu Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp
1130 1135 1140

Lys Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp
1145 1150 1155

Phe Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala
1160 1165 1170

Met Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His

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1175 1180 1185

Phe Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser
1190 1195 1200

Ile Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser
1205 1210 1215

Lys Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp
1220 1225 1230

Trp Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp
1235 1240 1245

Gly Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys
1250 1255 1260

Phe Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr
1265 1270 1275

Leu Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp
1280 1285 1290

Lys Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu
1295 1300 1305

Ile Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr
1310 1315 1320

Tyr Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn
1325 1330 1335

Leu Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val
1340 1345 1350

Arg Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu
1355 1360 1365

Ile Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu

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1370 1375 1380

Ile Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn
1385 1390 1395

Lys Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile
1400 1405 1410

Ser Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu
1415 1420 1425

Leu Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn
1430 1435 1440

Thr Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile
1445 1450 1455

Ala Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala
1460 1465 1470

Ile Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp
1475 1480 1485

Ser Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe
1490 1495 1500

Asn Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys
1505 1510 1515

Asp Asp Val Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn
1520 1525 1530

Thr Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn
1535 1540 1545

Gln Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser
1550 1555 1560

Ser Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr

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1565 1570 1575

Ser Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys
1580 1585 1590

Leu Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe
1595 1600 1605

Thr Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys
1610 1615 1620

Asp Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr
1625 1630 1635

Ser Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val
1640 1645 1650

Val Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser
1655 1660 1665

Thr Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg
1670 1675 1680

Tyr Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu
1685 1690 1695

Ile Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu
1700 1705 1710

Ile Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile
1715 1720 1725

Asn Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly
1730 1735 1740

Ser Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys
1745 1750 1755

Ile Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln

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1760 1765 1770

Ser Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu
1775 1780 1785

Ser Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu
1790 1795 1800

Asn Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn
1805 1810 1815

Lys Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu
1820 1825 1830

Ile Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe
1835 1840 1845

Asn Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr
1850 1855 1860

Phe Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile
1865 1870 1875

Asn Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu
1880 1885 1890

Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala
1895 1900 1905

Asn Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln
1910 1915 1920

Ser Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn
1925 1930 1935

Asn Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys
1940 1945 1950

Tyr Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln

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1955 1960 1965

Val Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile
1970 1975 1980

Ile Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe
1985 1990 1995

Asp Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp
2000 2005 2010

Gly Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly
2015 2020 2025

Val Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2030 2035 2040

Thr Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
2045 2050 2055

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
2060 2065 2070

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr
2075 2080 2085

Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr
2090 2095 2100

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala
2105 2110 2115

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2120 2125 2130

Thr Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
2135 2140 2145

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val

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2150 2155 2160

Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2165 2170 2175

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu
2180 2185 2190

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser
2195 2200 2205

Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile
2225 2230 2235

Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn
2240 2245 2250

Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn
2255 2260 2265

Asn Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly
2270 2275 2280

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu
2285 2290 2295

Gly Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly
2300 2305 2310

Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp
2315 2320 2325

Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala
2330 2335 2340

Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr

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2345 2350 2355

Phe Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2360 2365 2370

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser
2375 2380 2385

Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr
2390 2395 2400

Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe
2405 2410 2415

Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly
2420 2425 2430

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2435 2440 2445

Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg
2450 2455 2460

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val
2465 2470 2475

Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
2480 2485 2490

Asn Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser
2495 2500 2505

Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly
2510 2515 2520

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2525 2530 2535

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn

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2540 2545 2550

Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn
2555 2560 2565

Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr
2570 2575 2580

Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr
2585 2590 2595

Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile
2600 2605 2610

Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala
2615 2620 2625

Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln
2630 2635 2640

Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly
2705 2710

<210> 199
<211> 2710
<212> PRT
<213> Clostridium difficile

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<400> 199

Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1 5 10 15

Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
20 25 30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
35 40 45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn
50 55 60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65 70 75 80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
100 105 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
115 120 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
130 135 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145 150 155 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
165 170 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
180 185 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
195 200 205

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```
Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Pro Arg Pro Ser
    290                 295                 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
                325                 330                 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
            340                 345                 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
        355                 360                 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
    370                 375                 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385                 390                 395                 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
                405                 410                 415
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```
Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
            420                 425                 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
        435                 440                 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
    450                 455                 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465                 470                 475                 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
                485                 490                 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
            500                 505                 510

Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
        515                 520                 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
    530                 535                 540

Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545                 550                 555                 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
                565                 570                 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
            580                 585                 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
        595                 600                 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
    610                 615                 620
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```
Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625                 630                 635                 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
                645                 650                 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
            660                 665                 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
        675                 680                 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
    690                 695                 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705                 710                 715                 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser
                725                 730                 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
            740                 745                 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
        755                 760                 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
    770                 775                 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785                 790                 795                 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
                805                 810                 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
            820                 825                 830
```

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```
Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
        835                 840                 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
    850                 855                 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865                 870                 875                 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
                885                 890                 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
            900                 905                 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
        915                 920                 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
    930                 935                 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945                 950                 955                 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
                965                 970                 975

Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
            980                 985                 990

Ala Gln Leu Phe Ser Thr Gly Leu  Asn Thr Ile Tyr Asp  Ser Ile Gln
        995                 1000                1005

Leu Val  Asn Leu Ile Ser Asn  Ala Val Asn Asp Thr  Ile Asn Val
    1010                1015                1020

Leu Pro  Thr Ile Thr Glu Gly  Ile Pro Ile Val Ser  Thr Ile Leu
    1025                1030                1035
```

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```
Asp Gly  Ile Asn Leu Gly Ala  Ala Ile Lys Glu Leu  Leu Asp Glu
    1040                1045                1050

His Asp  Pro Leu Leu Lys Lys  Glu Leu Glu Ala Lys  Val Gly Val
    1055                1060                1065

Leu Ala  Ile Asn Met Ser Leu  Ser Ile Ala Ala Thr  Val Ala Ser
    1070                1075                1080

Ile Val  Gly Ile Gly Ala Glu  Val Thr Ile Phe Leu  Leu Pro Ile
    1085                1090                1095

Ala Gly  Ile Ser Ala Gly Ile  Pro Ser Leu Val Asn  Asn Glu Leu
    1100                1105                1110

Ile Leu  His Asp Lys Ala Thr  Ser Val Val Asn Tyr  Phe Asn His
    1115                1120                1125

Leu Ser  Glu Ser Lys Glu Tyr  Gly Pro Leu Lys Thr  Glu Asp Asp
    1130                1135                1140

Lys Ile  Leu Val Pro Ile Asp  Asp Leu Val Ile Ser  Glu Ile Asp
    1145                1150                1155

Phe Asn  Asn Asn Ser Ile Lys  Leu Gly Thr Cys Asn  Ile Leu Ala
    1160                1165                1170

Met Glu  Gly Gly Ser Gly His  Thr Val Thr Gly Asn  Ile Asp His
    1175                1180                1185

Phe Phe  Ser Ser Pro Tyr Ile  Ser Ser His Ile Pro  Ser Leu Ser
    1190                1195                1200

Val Tyr  Ser Ala Ile Gly Ile  Lys Thr Glu Asn Leu  Asp Phe Ser
    1205                1210                1215

Lys Lys  Ile Met Met Leu Pro  Asn Ala Pro Ser Arg  Val Phe Trp
    1220                1225                1230
```

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```
Trp Glu  Thr Gly Ala Val Pro  Gly Leu Arg Ser Leu  Glu Asn Asn
    1235                1240                1245

Gly Thr  Lys Leu Leu Asp Ser  Ile Arg Asp Leu Tyr  Pro Gly Lys
    1250                1255                1260

Phe Tyr  Trp Arg Phe Tyr Ala  Phe Phe Asp Tyr Ala  Ile Thr Thr
    1265                1270                1275

Leu Lys  Pro Val Tyr Glu Asp  Thr Asn Thr Lys Ile  Lys Leu Asp
    1280                1285                1290

Lys Asp  Thr Arg Asn Phe Ile  Met Pro Thr Ile Thr  Thr Asp Glu
    1295                1300                1305

Ile Arg  Asn Lys Leu Ser Tyr  Ser Phe Asp Gly Ala  Gly Gly Thr
    1310                1315                1320

Tyr Ser  Leu Leu Leu Ser Ser  Tyr Pro Ile Ser Met  Asn Ile Asn
    1325                1330                1335

Leu Ser  Lys Asp Asp Leu Trp  Ile Phe Asn Ile Asp  Asn Glu Val
    1340                1345                1350

Arg Glu  Ile Ser Ile Glu Asn  Gly Thr Ile Lys Lys  Gly Asn Leu
    1355                1360                1365

Ile Glu  Asp Val Leu Ser Lys  Ile Asp Ile Asn Lys  Asn Lys Leu
    1370                1375                1380

Ile Ile  Gly Asn Gln Thr Ile  Asp Phe Ser Gly Asp  Ile Asp Asn
    1385                1390                1395

Lys Asp  Arg Tyr Ile Phe Leu  Thr Cys Glu Leu Asp  Asp Lys Ile
    1400                1405                1410

Ser Leu  Ile Ile Glu Ile Asn  Leu Val Ala Lys Ser  Tyr Ser Leu
    1415                1420                1425
```

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Leu Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn
1430 1435 1440

Thr Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile
1445 1450 1455

Ala Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala
1460 1465 1470

Ile Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp
1475 1480 1485

Ser Lys Asn Ile Leu Glu Phe Tyr Asn Gly Ser Thr Leu Glu Phe
1490 1495 1500

Asn Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys
1505 1510 1515

Asp Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn
1520 1525 1530

Thr Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn
1535 1540 1545

Gln Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser
1550 1555 1560

Ser Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr
1565 1570 1575

Ser Asn Phe Met Asn Leu Phe Leu Asn Asn Ile Ser Phe Trp Lys
1580 1585 1590

Leu Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe
1595 1600 1605

Thr Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys
1610 1615 1620

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```
Asp Asn  Asn Lys Asn Ile Asp  Ile Tyr Phe Gly Glu  Trp Lys Thr
    1625                1630                1635

Ser Ser  Ser Lys Ser Thr Ile  Phe Ser Gly Asn Gly  Arg Asn Val
    1640                1645                1650

Val Val  Glu Pro Ile Tyr Asn  Pro Asp Thr Gly Glu  Asp Ile Ser
    1655                1660                1665

Thr Ser  Leu Asp Phe Ser Tyr  Glu Pro Leu Tyr Gly  Ile Asp Arg
    1670                1675                1680

Tyr Ile  Asn Lys Val Leu Ile  Ala Pro Asp Leu Tyr  Thr Ser Leu
    1685                1690                1695

Ile Asn  Ile Asn Thr Asn Tyr  Tyr Ser Asn Glu Tyr  Tyr Pro Glu
    1700                1705                1710

Ile Ile  Val Leu Asn Pro Asn  Thr Phe His Lys Lys  Val Asn Ile
    1715                1720                1725

Asn Leu  Asp Ser Ser Ser Phe  Glu Tyr Lys Trp Ser  Thr Glu Gly
    1730                1735                1740

Ser Asp  Phe Ile Leu Val Arg  Tyr Leu Glu Glu Ser  Asn Lys Lys
    1745                1750                1755

Ile Leu  Gln Lys Ile Arg Ile  Lys Gly Ile Leu Ser  Asn Thr Gln
    1760                1765                1770

Ser Phe  Asn Lys Met Ser Ile  Asp Phe Lys Asp Ile  Lys Lys Leu
    1775                1780                1785

Ser Leu  Gly Tyr Ile Met Ser  Asn Phe Lys Ser Phe  Asn Ser Glu
    1790                1795                1800

Asn Glu  Leu Asp Arg Asp His  Leu Gly Phe Lys Ile  Ile Asp Asn
    1805                1810                1815
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Lys Thr  Tyr Tyr Tyr Asp Glu  Asp Ser Lys Leu Val  Lys Gly Leu
    1820                1825                1830

Ile Asn  Ile Asn Asn Ser Leu  Phe Tyr Phe Asp Pro  Ile Glu Ser
    1835                1840                1845

Asn Leu  Val Thr Gly Trp Gln  Thr Ile Asn Gly Lys  Lys Tyr Tyr
    1850                1855                1860

Phe Asp  Ile Asn Thr Gly Ala  Ala Ser Thr Ser Tyr  Lys Ile Ile
    1865                1870                1875

Asn Gly  Lys His Phe Tyr Phe  Asn Asn Asn Gly Val  Met Gln Leu
    1880                1885                1890

Gly Val  Phe Lys Gly Pro Asp  Gly Phe Glu Tyr Phe  Ala Pro Ala
    1895                1900                1905

Asn Thr  Gln Asn Asn Asn Ile  Glu Gly Gln Ala Ile  Val Tyr Gln
    1910                1915                1920

Ser Lys  Phe Leu Thr Leu Asn  Gly Lys Lys Tyr Tyr  Phe Asp Asn
    1925                1930                1935

Asp Ser  Lys Ala Val Thr Gly  Trp Arg Ile Ile Asn  Asn Glu Lys
    1940                1945                1950

Tyr Tyr  Phe Asn Pro Asn Asn  Ala Ile Ala Ala Val  Gly Leu Gln
    1955                1960                1965

Val Ile  Asp Asn Asn Lys Tyr  Tyr Phe Asn Pro Asp  Thr Ala Ile
    1970                1975                1980

Ile Ser  Lys Gly Trp Gln Thr  Val Asn Gly Ser Arg  Tyr Tyr Phe
    1985                1990                1995

Asp Thr  Asp Thr Ala Ile Ala  Phe Asn Gly Tyr Lys  Thr Ile Asp
    2000                2005                2010
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Gly Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly
2015 2020 2025

Val Phe Ser Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2030 2035 2040

Thr Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
2045 2050 2055

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
2060 2065 2070

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr
2075 2080 2085

Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr
2090 2095 2100

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala
2105 2110 2115

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2120 2125 2130

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
2135 2140 2145

Lys Tyr Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2150 2155 2160

Phe Lys Val Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2165 2170 2175

His Asn Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Lys
2180 2185 2190

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser
2195 2200 2205

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Lys Ala Ile Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Asn Asn Ala Ile Ala Ala Thr His Leu Cys Thr Ile
2225 2230 2235

Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn
2240 2245 2250

Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn
2255 2260 2265

Asn Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly
2270 2275 2280

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu
2285 2290 2295

Gly Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly
2300 2305 2310

Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp
2315 2320 2325

Gln Thr Ile Asp Ser Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala
2330 2335 2340

Val Ala Val Thr Gly Trp Gln Thr Ile Asp Gly Glu Lys Tyr Tyr
2345 2350 2355

Phe Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2360 2365 2370

Asp Gly Lys Arg Tyr Tyr Phe Asn Thr Asn Thr Tyr Ile Ala Ser
2375 2380 2385

Thr Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr Phe Asn Thr
2390 2395 2400

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Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly Phe
2405 2410 2415

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2420 2425 2430

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2435 2440 2445

Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg
2450 2455 2460

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val
2465 2470 2475

Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
2480 2485 2490

Asn Thr Asn Thr Tyr Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser
2495 2500 2505

Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly
2510 2515 2520

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2525 2530 2535

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2540 2545 2550

Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asp
2555 2560 2565

Ser Lys Ala Ala Thr Gly Trp Ala Thr Ile Asp Gly Asn Arg Tyr
2570 2575 2580

Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr
2585 2590 2595

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Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile
2600 2605 2610

Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala
2615 2620 2625

Asn Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg Tyr Gln
2630 2635 2640

Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Ser Lys Val
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly
2705 2710

<210> 200
<211> 2710
<212> PRT
<213> Clostridium difficile

<400> 200

Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1 5 10 15

Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
20 25 30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
35 40 45

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Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn
    50                  55                  60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65                  70                  75                  80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
            100                 105                 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
        115                 120                 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
    130                 135                 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255
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Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Pro Arg Pro Ser
    290                 295                 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
                325                 330                 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
            340                 345                 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
        355                 360                 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
    370                 375                 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385                 390                 395                 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
                405                 410                 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
            420                 425                 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
        435                 440                 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
    450                 455                 460
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Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465                 470                 475                 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
                485                 490                 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
            500                 505                 510

Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
        515                 520                 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
    530                 535                 540

Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545                 550                 555                 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
                565                 570                 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
            580                 585                 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
        595                 600                 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
    610                 615                 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625                 630                 635                 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
                645                 650                 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
            660                 665                 670
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Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
        675                 680                 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
    690                 695                 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705                 710                 715                 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser
                725                 730                 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
            740                 745                 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
        755                 760                 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
    770                 775                 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785                 790                 795                 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
                805                 810                 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
            820                 825                 830

Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
        835                 840                 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
    850                 855                 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865                 870                 875                 880
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```
Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
                885                 890                 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
            900                 905                 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
        915                 920                 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
    930                 935                 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945                 950                 955                 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
                965                 970                 975

Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
            980                 985                 990

Ala Gln Leu Phe Ser Thr Gly Leu  Asn Thr Ile Tyr Asp  Ser Ile Gln
        995                 1000                1005

Leu Val  Asn Leu Ile Ser Asn  Ala Val Asn Asp Thr  Ile Asn Val
    1010                1015                1020

Leu Pro  Thr Ile Thr Glu Gly  Ile Pro Ile Val Ser  Thr Ile Leu
    1025                1030                1035

Asp Gly  Ile Asn Leu Gly Ala  Ala Ile Lys Glu Leu  Leu Asp Glu
    1040                1045                1050

His Asp  Pro Leu Leu Lys Lys  Glu Leu Glu Ala Lys  Val Gly Val
    1055                1060                1065

Leu Ala  Ile Asn Met Ser Leu  Ser Ile Ala Ala Thr  Val Ala Ser
    1070                1075                1080
```

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```
Ile Val  Gly Ile Gly Ala Glu  Val Thr Ile Phe Leu  Leu Pro Ile
    1085                1090                1095

Ala Gly  Ile Ser Ala Gly Ile  Pro Ser Leu Val Asn  Asn Glu Leu
    1100                1105                1110

Ile Leu  His Asp Lys Ala Thr  Ser Val Val Asn Tyr  Phe Asn His
    1115                1120                1125

Leu Ser  Glu Ser Lys Glu Tyr  Gly Pro Leu Lys Thr  Glu Asp Asp
    1130                1135                1140

Lys Ile  Leu Val Pro Ile Asp  Asp Leu Val Ile Ser  Glu Ile Asp
    1145                1150                1155

Phe Asn  Asn Asn Ser Ile Lys  Leu Gly Thr Cys Asn  Ile Leu Ala
    1160                1165                1170

Met Glu  Gly Gly Ser Gly His  Thr Val Thr Gly Asn  Ile Asp His
    1175                1180                1185

Phe Phe  Ser Ser Pro Tyr Ile  Ser Ser His Ile Pro  Ser Leu Ser
    1190                1195                1200

Val Tyr  Ser Ala Ile Gly Ile  Lys Thr Glu Asn Leu  Asp Phe Ser
    1205                1210                1215

Lys Lys  Ile Met Met Leu Pro  Asn Ala Pro Ser Arg  Val Phe Trp
    1220                1225                1230

Trp Glu  Thr Gly Ala Val Pro  Gly Leu Arg Ser Leu  Glu Asn Asn
    1235                1240                1245

Gly Thr  Lys Leu Leu Asp Ser  Ile Arg Asp Leu Tyr  Pro Gly Lys
    1250                1255                1260

Phe Tyr  Trp Arg Phe Tyr Ala  Phe Phe Asp Tyr Ala  Ile Thr Thr
    1265                1270                1275
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Leu Lys Pro Val Tyr Glu Asp Thr Asn Thr Lys Ile Lys Leu Asp
1280 1285 1290

Lys Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asp Glu
1295 1300 1305

Ile Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr
1310 1315 1320

Tyr Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Met Asn Ile Asn
1325 1330 1335

Leu Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val
1340 1345 1350

Arg Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Asn Leu
1355 1360 1365

Ile Glu Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu
1370 1375 1380

Ile Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn
1385 1390 1395

Lys Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile
1400 1405 1410

Ser Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu
1415 1420 1425

Leu Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn
1430 1435 1440

Thr Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile
1445 1450 1455

Ala Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala
1460 1465 1470

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Ile Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp
1475 1480 1485

Ser Lys Asn Ile Leu Glu Phe Tyr Asn Gly Ser Thr Leu Glu Phe
1490 1495 1500

Asn Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys
1505 1510 1515

Asp Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn
1520 1525 1530

Thr Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn
1535 1540 1545

Gln Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser
1550 1555 1560

Ser Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr
1565 1570 1575

Ser Asn Phe Met Asn Leu Phe Leu Asn Asn Ile Ser Phe Trp Lys
1580 1585 1590

Leu Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe
1595 1600 1605

Thr Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys
1610 1615 1620

Asp Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr
1625 1630 1635

Ser Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val
1640 1645 1650

Val Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser
1655 1660 1665

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Thr Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg
1670 1675 1680

Tyr Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu
1685 1690 1695

Ile Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu
1700 1705 1710

Ile Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile
1715 1720 1725

Asn Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly
1730 1735 1740

Ser Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys
1745 1750 1755

Ile Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln
1760 1765 1770

Ser Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu
1775 1780 1785

Ser Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu
1790 1795 1800

Asn Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn
1805 1810 1815

Lys Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu
1820 1825 1830

Ile Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Ser
1835 1840 1845

Asn Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr
1850 1855 1860

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```
Phe Asp  Ile Asn Thr Gly Ala  Ala Ser Thr Ser Tyr  Lys Ile Ile
    1865                1870                1875

Asn Gly  Lys His Phe Tyr Phe  Asn Asn Asn Gly Val  Met Gln Leu
    1880                1885                1890

Gly Val  Phe Lys Gly Pro Asp  Gly Phe Glu Tyr Phe  Ala Pro Ala
    1895                1900                1905

Asn Thr  Gln Asn Asn Asn Ile  Glu Gly Gln Ala Ile  Val Tyr Gln
    1910                1915                1920

Ser Lys  Phe Leu Thr Leu Asn  Gly Lys Lys Tyr Tyr  Phe Asp Asn
    1925                1930                1935

Asp Ser  Lys Ala Val Thr Gly  Trp Arg Ile Ile Asn  Asn Glu Lys
    1940                1945                1950

Tyr Tyr  Phe Asn Pro Asn Asn  Ala Ile Ala Ala Val  Gly Leu Gln
    1955                1960                1965

Val Ile  Asp Asn Asn Lys Tyr  Tyr Phe Asn Pro Asp  Thr Ala Ile
    1970                1975                1980

Ile Ser  Lys Gly Trp Gln Thr  Val Asn Gly Ser Arg  Tyr Tyr Phe
    1985                1990                1995

Asp Thr  Asp Thr Ala Ile Ala  Phe Asn Gly Tyr Lys  Thr Ile Asp
    2000                2005                2010

Gly Lys  His Phe Tyr Phe Asp  Ser Asp Cys Val Val  Lys Ile Gly
    2015                2020                2025

Val Phe  Ser Gly Ser Asn Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2030                2035                2040

Thr Tyr  Asn Asn Asn Ile Glu  Gly Gln Ala Ile Val  Tyr Gln Ser
    2045                2050                2055
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Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
2060 2065 2070

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr
2075 2080 2085

Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr
2090 2095 2100

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala
2105 2110 2115

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2120 2125 2130

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
2135 2140 2145

Lys Tyr Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2150 2155 2160

Phe Lys Val Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2165 2170 2175

His Asn Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Lys
2180 2185 2190

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser
2195 2200 2205

Lys Ala Ile Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Asn Asn Ala Ile Ala Ala Thr His Leu Cys Thr Ile
2225 2230 2235

Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn
2240 2245 2250

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Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn
2255 2260 2265

Asn Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly
2270 2275 2280

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu
2285 2290 2295

Gly Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly
2300 2305 2310

Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp
2315 2320 2325

Gln Thr Ile Asp Ser Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala
2330 2335 2340

Val Ala Val Thr Gly Trp Gln Thr Ile Asp Gly Glu Lys Tyr Tyr
2345 2350 2355

Phe Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2360 2365 2370

Asp Gly Lys Arg Tyr Tyr Phe Asn Thr Asn Thr Tyr Ile Ala Ser
2375 2380 2385

Thr Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr Phe Asn Thr
2390 2395 2400

Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly Phe
2405 2410 2415

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2420 2425 2430

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2435 2440 2445

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Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg
2450 2455 2460

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val
2465 2470 2475

Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
2480 2485 2490

Asn Thr Asn Thr Tyr Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser
2495 2500 2505

Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly
2510 2515 2520

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2525 2530 2535

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2540 2545 2550

Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asp
2555 2560 2565

Ser Lys Ala Ala Thr Gly Trp Ala Thr Ile Asp Gly Asn Arg Tyr
2570 2575 2580

Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr
2585 2590 2595

Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile
2600 2605 2610

Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala
2615 2620 2625

Asn Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg Tyr Gln
2630 2635 2640

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Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Ser Lys Val
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly
2705 2710

<210> 201
<211> 2710
<212> PRT
<213> Clostridium difficile

<400> 201

Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1 5 10 15

Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
20 25 30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
35 40 45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn
50 55 60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65 70 75 80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
85 90 95

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```
Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
            100                 105                 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
        115                 120                 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
    130                 135                 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
    290                 295                 300
```

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```
Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
                325                 330                 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
            340                 345                 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
        355                 360                 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
    370                 375                 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385                 390                 395                 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
                405                 410                 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
            420                 425                 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
        435                 440                 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
    450                 455                 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465                 470                 475                 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
                485                 490                 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
            500                 505                 510
```

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```
Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
        515                 520                 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
    530                 535                 540

Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545                 550                 555                 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
                565                 570                 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
            580                 585                 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
        595                 600                 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
    610                 615                 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625                 630                 635                 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
                645                 650                 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
            660                 665                 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
        675                 680                 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
    690                 695                 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705                 710                 715                 720
```

```
Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser
                725                 730                 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
            740                 745                 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
        755                 760                 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
    770                 775                 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785                 790                 795                 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
                805                 810                 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
            820                 825                 830

Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
        835                 840                 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
    850                 855                 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865                 870                 875                 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
                885                 890                 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
            900                 905                 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
        915                 920                 925
```

```
Lys Glu Ile Ser Thr Ile Lys Asp Ser Ile Ile Thr Asp Val Asn Gly
    930                 935                 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945                 950                 955                 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
                965                 970                 975

Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
            980                 985                 990

Ala Gln Leu Phe Ser Thr Gly Leu  Asn Thr Ile Tyr Asp  Ser Ile Gln
        995                 1000                1005

Leu Val  Asn Leu Ile Ser Asn  Ala Val Asn Asp Thr  Ile Asn Val
    1010                1015                1020

Leu Pro  Thr Ile Thr Glu Gly  Ile Pro Ile Val Ser  Thr Ile Leu
    1025                1030                1035

Asp Gly  Ile Asn Leu Gly Ala  Ala Ile Lys Glu Leu  Leu Asp Glu
    1040                1045                1050

His Asp  Pro Leu Leu Lys Lys  Glu Leu Glu Ala Lys  Val Gly Val
    1055                1060                1065

Leu Ala  Ile Asn Met Ser Leu  Ser Ile Ala Ala Thr  Val Ala Ser
    1070                1075                1080

Ile Val  Gly Ile Gly Ala Glu  Val Thr Ile Phe Leu  Leu Pro Ile
    1085                1090                1095

Ala Gly  Ile Ser Ala Gly Ile  Pro Ser Leu Val Asn  Asn Glu Leu
    1100                1105                1110

Ile Leu  His Asp Lys Ala Thr  Ser Val Val Asn Tyr  Phe Asn His
    1115                1120                1125
```

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Leu Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp
1130 1135 1140

Lys Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp
1145 1150 1155

Phe Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala
1160 1165 1170

Met Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His
1175 1180 1185

Phe Phe Ser Ser Pro Tyr Ile Ser Ser His Ile Pro Ser Leu Ser
1190 1195 1200

Val Tyr Ser Ala Ile Gly Ile Lys Thr Glu Asn Leu Asp Phe Ser
1205 1210 1215

Lys Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp
1220 1225 1230

Trp Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp
1235 1240 1245

Gly Thr Lys Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys
1250 1255 1260

Phe Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr
1265 1270 1275

Leu Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp
1280 1285 1290

Lys Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asp Glu
1295 1300 1305

Ile Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr
1310 1315 1320

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```
Tyr Ser  Leu Leu Leu Ser Ser  Tyr Pro Ile Ser Met  Asn Ile Asn
    1325                1330                1335

Leu Ser  Lys Asp Asp Leu Trp  Ile Phe Asn Ile Asp  Asn Glu Val
    1340                1345                1350

Arg Glu  Ile Ser Ile Glu Asn  Gly Thr Ile Lys Lys  Gly Asn Leu
    1355                1360                1365

Ile Glu  Asp Val Leu Ser Lys  Ile Asp Ile Asn Lys  Asn Lys Leu
    1370                1375                1380

Ile Ile  Gly Asn Gln Thr Ile  Asp Phe Ser Gly Asp  Ile Asp Asn
    1385                1390                1395

Lys Asp  Arg Tyr Ile Phe Leu  Thr Cys Glu Leu Asp  Asp Lys Ile
    1400                1405                1410

Ser Leu  Ile Ile Glu Ile Asn  Leu Val Ala Lys Ser  Tyr Ser Leu
    1415                1420                1425

Leu Leu  Ser Gly Asp Lys Asn  Tyr Leu Ile Ser Asn  Leu Ser Asn
    1430                1435                1440

Thr Ile  Glu Lys Ile Asn Thr  Leu Gly Leu Asp Ser  Lys Asn Ile
    1445                1450                1455

Ala Tyr  Asn Tyr Thr Asp Glu  Ser Asn Asn Lys Tyr  Phe Gly Val
    1460                1465                1470

Ile Ser  Lys Thr Ser Gln Lys  Ser Ile Ile His Tyr  Lys Lys Asp
    1475                1480                1485

Ser Lys  Asn Ile Leu Glu Phe  Tyr Asn Gly Ser Thr  Leu Glu Phe
    1490                1495                1500

Asn Ser  Lys Asp Phe Ile Ala  Glu Asp Ile Asn Val  Phe Met Lys
    1505                1510                1515
```

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```
Asp Asp  Ile Asn Thr Ile Thr  Gly Lys Tyr Tyr Val  Asp Asn Asn
    1520                1525                1530

Thr Asp  Lys Ser Ile Asp Phe  Ser Ile Ser Leu Val  Ser Lys Asn
    1535                1540                1545

Gln Val  Lys Val Asn Gly Leu  Tyr Leu Asn Glu Ser  Val Tyr Ser
    1550                1555                1560

Ser Tyr  Leu Asp Phe Val Lys  Asn Ser Asp Gly His  His Asn Thr
    1565                1570                1575

Ser Asn  Phe Met Asn Leu Phe  Leu Asn Asn Ile Ser  Phe Trp Lys
    1580                1585                1590

Leu Phe  Gly Phe Glu Asn Ile  Asn Phe Val Ile Asp  Lys Tyr Phe
    1595                1600                1605

Thr Leu  Val Gly Lys Thr Asn  Leu Gly Tyr Val Glu  Phe Ile Cys
    1610                1615                1620

Asp Asn  Asn Lys Asn Ile Asp  Ile Tyr Phe Gly Glu  Trp Lys Thr
    1625                1630                1635

Ser Ser  Ser Lys Ser Thr Ile  Phe Ser Gly Asn Gly  Arg Asn Val
    1640                1645                1650

Val Val  Glu Pro Ile Tyr Asn  Pro Asp Thr Gly Glu  Asp Ile Ser
    1655                1660                1665

Thr Ser  Leu Asp Phe Ser Tyr  Glu Pro Leu Tyr Gly  Ile Asp Arg
    1670                1675                1680

Tyr Ile  Asn Lys Val Leu Ile  Ala Pro Asp Leu Tyr  Thr Ser Leu
    1685                1690                1695

Ile Asn  Ile Asn Thr Asn Tyr  Tyr Ser Asn Glu Tyr  Tyr Pro Glu
    1700                1705                1710
```

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```
Ile Ile  Val Leu Asn Pro Asn  Thr Phe His Lys Lys  Val Asn Ile
    1715                1720                1725

Asn Leu  Asp Ser Ser Ser Phe  Glu Tyr Lys Trp Ser  Thr Glu Gly
    1730                1735                1740

Ser Asp  Phe Ile Leu Val Arg  Tyr Leu Glu Glu Ser  Asn Lys Lys
    1745                1750                1755

Ile Leu  Gln Lys Ile Arg Ile  Lys Gly Ile Leu Ser  Asn Thr Gln
    1760                1765                1770

Ser Phe  Asn Lys Met Ser Ile  Asp Phe Lys Asp Ile  Lys Lys Leu
    1775                1780                1785

Ser Leu  Gly Tyr Ile Met Ser  Asn Phe Lys Ser Phe  Asn Ser Glu
    1790                1795                1800

Asn Glu  Leu Asp Arg Asp His  Leu Gly Phe Lys Ile  Ile Asp Asn
    1805                1810                1815

Lys Thr  Tyr Tyr Tyr Asp Glu  Asp Ser Lys Leu Val  Lys Gly Leu
    1820                1825                1830

Ile Asn  Ile Asn Asn Ser Leu  Phe Tyr Phe Asp Pro  Ile Glu Ser
    1835                1840                1845

Asn Leu  Val Thr Gly Trp Gln  Thr Ile Asn Gly Lys  Lys Tyr Tyr
    1850                1855                1860

Phe Asp  Ile Asn Thr Gly Ala  Ala Ser Thr Ser Tyr  Lys Ile Ile
    1865                1870                1875

Asn Gly  Lys His Phe Tyr Phe  Asn Asn Asn Gly Val  Met Gln Leu
    1880                1885                1890

Gly Val  Phe Lys Gly Pro Asp  Gly Phe Glu Tyr Phe  Ala Pro Ala
    1895                1900                1905
```

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```
Asn Thr  Gln Asn Asn Asn Ile  Glu Gly Gln Ala Ile  Val Tyr Gln
    1910                1915                1920

Ser Lys  Phe Leu Thr Leu Asn  Gly Lys Lys Tyr Tyr  Phe Asp Asn
    1925                1930                1935

Asp Ser  Lys Ala Val Ser Gly  Trp Arg Ile Ile Asn  Asn Glu Lys
    1940                1945                1950

Tyr Tyr  Phe Asn Pro Asn Asn  Ala Ile Ala Ala Val  Gly Leu Gln
    1955                1960                1965

Val Ile  Asp Asn Asn Lys Tyr  Tyr Phe Asn Pro Asp  Thr Ala Ile
    1970                1975                1980

Ile Ser  Lys Gly Trp Gln Thr  Val Asn Gly Ser Arg  Tyr Tyr Phe
    1985                1990                1995

Asp Thr  Asp Thr Ala Ile Ala  Phe Asn Gly Tyr Lys  Thr Ile Asp
    2000                2005                2010

Gly Lys  His Phe Tyr Phe Asp  Ser Asp Cys Val Val  Lys Ile Gly
    2015                2020                2025

Val Phe  Ser Gly Ser Asn Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2030                2035                2040

Thr Tyr  Asn Asn Asn Ile Glu  Gly Gln Ala Ile Val  Tyr Gln Ser
    2045                2050                2055

Lys Phe  Leu Thr Leu Asn Gly  Lys Lys Tyr Tyr Phe  Asp Asn Asn
    2060                2065                2070

Ser Lys  Ala Val Thr Gly Trp  Gln Thr Ile Asp Ser  Lys Lys Tyr
    2075                2080                2085

Tyr Phe  Asn Thr Asn Thr Ala  Glu Ala Ala Thr Gly  Trp Gln Thr
    2090                2095                2100
```

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```
Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr Asn Thr  Ala Glu Ala
    2105                2110                2115

Ala Thr  Gly Trp Gln Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn
    2120                2125                2130

Thr Asn  Thr Ser Ile Ala Ser  Thr Gly Tyr Thr Ile  Ile Asn Gly
    2135                2140                2145

Lys His  Phe Tyr Phe Asn Thr  Asp Gly Ile Met Gln  Ile Gly Val
    2150                2155                2160

Phe Lys  Gly Pro Asn Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr
    2165                2170                2175

His Asn  Asn Asn Ile Glu Gly  Gln Ala Ile Leu Tyr  Gln Asn Lys
    2180                2185                2190

Phe Leu  Thr Leu Asn Gly Lys  Lys Tyr Tyr Phe Gly  Ser Asp Ser
    2195                2200                2205

Lys Ala  Ile Thr Gly Trp Gln  Thr Ile Asp Gly Lys  Lys Tyr Tyr
    2210                2215                2220

Phe Asn  Pro Asn Asn Ala Ile  Ala Ala Thr His Leu  Cys Thr Ile
    2225                2230                2235

Asn Asn  Asp Lys Tyr Tyr Phe  Ser Tyr Asp Gly Ile  Leu Gln Asn
    2240                2245                2250

Gly Tyr  Ile Thr Ile Glu Arg  Asn Asn Phe Tyr Phe  Asp Ala Asn
    2255                2260                2265

Asn Glu  Ser Lys Met Val Thr  Gly Val Phe Lys Gly  Pro Asn Gly
    2270                2275                2280

Phe Glu  Tyr Phe Ala Pro Ala  Asn Thr His Asn Asn  Asn Ile Glu
    2285                2290                2295
```

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```
Gly Gln  Ala Ile Val Tyr Gln  Asn Lys Phe Leu Thr  Leu Asn Gly
    2300                2305                2310

Lys Lys  Tyr Tyr Phe Asp Asn  Asp Ser Lys Ala Val  Thr Gly Trp
    2315                2320                2325

Gln Thr  Ile Asp Ser Lys Lys  Tyr Tyr Phe Asn Leu  Asn Thr Ala
    2330                2335                2340

Val Ala  Val Thr Gly Trp Gln  Thr Ile Asp Gly Glu  Lys Tyr Tyr
    2345                2350                2355

Phe Asn  Leu Asn Thr Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile
    2360                2365                2370

Asp Gly  Lys Arg Tyr Tyr Phe  Asn Thr Asn Thr Tyr  Ile Ala Ser
    2375                2380                2385

Thr Gly  Tyr Thr Ile Ile Asn  Gly Lys His Phe Tyr  Phe Asn Thr
    2390                2395                2400

Asp Gly  Ile Met Gln Ile Gly  Val Phe Lys Gly Pro  Asp Gly Phe
    2405                2410                2415

Glu Tyr  Phe Ala Pro Ala Asn  Thr His Asn Asn Asn  Ile Glu Gly
    2420                2425                2430

Gln Ala  Ile Leu Tyr Gln Asn  Lys Phe Leu Thr Leu  Asn Gly Lys
    2435                2440                2445

Lys Tyr  Tyr Phe Gly Ser Asp  Ser Lys Ala Val Thr  Gly Leu Arg
    2450                2455                2460

Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn Thr Asn  Thr Ala Val
    2465                2470                2475

Ala Val  Thr Gly Trp Gln Thr  Ile Asn Gly Lys Lys  Tyr Tyr Phe
    2480                2485                2490
```

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```
Asn Thr  Asn Thr Ser Ile Ala  Ser Thr Gly Tyr Thr  Ile Ile Ser
    2495                 2500                 2505

Gly Lys  His Phe Tyr Phe Asn  Thr Asp Gly Ile Met  Gln Ile Gly
    2510                 2515                 2520

Val Phe  Lys Gly Pro Asp Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2525                 2530                 2535

Thr Asp  Ala Asn Asn Ile Glu  Gly Gln Ala Ile Arg  Tyr Gln Asn
    2540                 2545                 2550

Arg Phe  Leu Tyr Leu His Asp  Asn Ile Tyr Tyr Phe  Gly Asn Asp
    2555                 2560                 2565

Ser Lys  Ala Ala Thr Gly Trp  Ala Thr Ile Asp Gly  Asn Arg Tyr
    2570                 2575                 2580

Tyr Phe  Glu Pro Asn Thr Ala  Met Gly Ala Asn Gly  Tyr Lys Thr
    2585                 2590                 2595

Ile Asp  Asn Lys Asn Phe Tyr  Phe Arg Asn Gly Leu  Pro Gln Ile
    2600                 2605                 2610

Gly Val  Phe Lys Gly Pro Asn  Gly Phe Glu Tyr Phe  Ala Pro Ala
    2615                 2620                 2625

Asn Thr  Asp Ala Asn Asn Ile  Asp Gly Gln Ala Ile  Arg Tyr Gln
    2630                 2635                 2640

Asn Arg  Phe Leu His Leu Leu  Gly Lys Ile Tyr Tyr  Phe Gly Asn
    2645                 2650                 2655

Asn Ser  Lys Ala Val Thr Gly  Trp Gln Thr Ile Asn  Ser Lys Val
    2660                 2665                 2670

Tyr Tyr  Phe Met Pro Asp Thr  Ala Met Ala Ala Ala  Gly Gly Leu
    2675                 2680                 2685
```

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Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly
2705 2710

<210> 202
<211> 2710
<212> PRT
<213> Clostridium difficile

<400> 202

Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1 5 10 15

Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
20 25 30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
35 40 45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn
50 55 60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65 70 75 80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
100 105 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
115 120 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
130 135 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile

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145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Val Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
    290                 295                 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
                325                 330                 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
            340                 345                 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
```

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355 360 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
370 375 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385 390 395 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
405 410 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
420 425 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
435 440 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
450 455 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465 470 475 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
485 490 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
500 505 510

Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
515 520 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
530 535 540

Asp Asn Glu Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545 550 555 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser

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565 570 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
580 585 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
595 600 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
610 615 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625 630 635 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
645 650 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
660 665 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
675 680 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
690 695 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705 710 715 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser
725 730 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
740 745 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
755 760 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser

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770 775 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785 790 795 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Thr Ser Val Ser
805 810 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
820 825 830

Ser Val Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
835 840 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
850 855 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865 870 875 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
885 890 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
900 905 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
915 920 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
930 935 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945 950 955 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
965 970 975

Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr

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980 985 990

Ala Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln
995 1000 1005

Leu Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val
1010 1015 1020

Leu Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu
1025 1030 1035

Asp Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu
1040 1045 1050

His Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val
1055 1060 1065

Leu Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser
1070 1075 1080

Ile Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile
1085 1090 1095

Ala Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu
1100 1105 1110

Ile Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His
1115 1120 1125

Leu Ser Glu Ser Lys Glu Tyr Gly Pro Leu Lys Thr Glu Asp Asp
1130 1135 1140

Lys Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp
1145 1150 1155

Phe Asn Asn Asn Ala Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala
1160 1165 1170

Met Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His

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1175 1180 1185

Phe Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser
1190 1195 1200

Ile Tyr Ser Ala Ile Gly Ile Lys Thr Glu Asn Leu Asp Phe Ser
1205 1210 1215

Lys Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp
1220 1225 1230

Trp Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asn
1235 1240 1245

Gly Thr Lys Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys
1250 1255 1260

Phe Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr
1265 1270 1275

Leu Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp
1280 1285 1290

Lys Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu
1295 1300 1305

Ile Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr
1310 1315 1320

Tyr Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn
1325 1330 1335

Leu Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val
1340 1345 1350

Arg Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu
1355 1360 1365

Ile Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu

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1370 1375 1380

Ile Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn
1385 1390 1395

Lys Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile
1400 1405 1410

Ser Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu
1415 1420 1425

Leu Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn
1430 1435 1440

Thr Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile
1445 1450 1455

Ala Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala
1460 1465 1470

Ile Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp
1475 1480 1485

Ser Lys Asn Ile Leu Glu Phe Tyr Asn Gly Ser Thr Leu Glu Phe
1490 1495 1500

Asn Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys
1505 1510 1515

Asp Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn
1520 1525 1530

Thr Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn
1535 1540 1545

Gln Ala Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser
1550 1555 1560

Ser Tyr Leu Asp Phe Val Lys Asn Ala Asp Gly His His Asn Thr

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1565 1570 1575

Ser Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys
1580 1585 1590

Leu Phe Gly Phe Glu Asn Ile Asn Phe Val Val Asp Lys Tyr Phe
1595 1600 1605

Thr Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys
1610 1615 1620

Asp Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr
1625 1630 1635

Ser Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val
1640 1645 1650

Val Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser
1655 1660 1665

Thr Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg
1670 1675 1680

Tyr Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu
1685 1690 1695

Ile Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu
1700 1705 1710

Ile Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile
1715 1720 1725

Asn Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly
1730 1735 1740

Ser Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys
1745 1750 1755

Ile Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln

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1760 1765 1770

Ser Phe Asn Lys Lys Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu
1775 1780 1785

Ser Leu Val Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu
1790 1795 1800

Asn Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn
1805 1810 1815

Lys Thr Tyr Tyr Tyr Asp Glu Ala Ser Lys Leu Val Lys Gly Leu
1820 1825 1830

Ile Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Ser
1835 1840 1845

Asn Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr
1850 1855 1860

Phe Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile
1865 1870 1875

Asn Gly Lys His Phe Tyr Phe Asn Asn Asn Gly Val Met Gln Leu
1880 1885 1890

Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala
1895 1900 1905

Asn Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln
1910 1915 1920

Ser Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn
1925 1930 1935

Asp Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys
1940 1945 1950

Tyr Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln

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1955 1960 1965

Val Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile
1970 1975 1980

Ile Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe
1985 1990 1995

Asp Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp
2000 2005 2010

Gly Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly
2015 2020 2025

Val Phe Ser Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2030 2035 2040

Thr Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
2045 2050 2055

Lys Phe Leu Thr Leu Asn Gly Glu Lys Tyr Tyr Phe Asp Asn Asn
2060 2065 2070

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr
2075 2080 2085

Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr
2090 2095 2100

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Val
2105 2110 2115

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2120 2125 2130

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
2135 2140 2145

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val

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2150 2155 2160

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2165 2170 2175

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Lys
2180 2185 2190

Phe Leu Thr Leu Asn Asp Lys Lys Tyr Tyr Phe Ala Ser Asp Ser
2195 2200 2205

Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Asn Asn Ala Ile Ala Ala Thr His Leu Tyr Thr Ile
2225 2230 2235

Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn
2240 2245 2250

Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn
2255 2260 2265

Asn Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly
2270 2275 2280

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu
2285 2290 2295

Gly Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly
2300 2305 2310

Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp
2315 2320 2325

Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala
2330 2335 2340

Val Ala Val Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr

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2345 2350 2355

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2360 2365 2370

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ser Ile Ala Ser
2375 2380 2385

Thr Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr Phe Asn Thr
2390 2395 2400

Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly Phe
2405 2410 2415

Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly
2420 2425 2430

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2435 2440 2445

Lys Tyr Tyr Phe Ala Ser Asp Ser Lys Ala Val Thr Gly Leu Arg
2450 2455 2460

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu
2465 2470 2475

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2480 2485 2490

Asn Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn
2495 2500 2505

Asp Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly
2510 2515 2520

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2525 2530 2535

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn

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2540 2545 2550

Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn
2555 2560 2565

Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Arg Arg Tyr
2570 2575 2580

Tyr Phe Glu Pro Asn Thr Ala Ile Gly Ala Asn Gly Tyr Lys Ile
2585 2590 2595

Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile
2600 2605 2610

Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala
2615 2620 2625

Asn Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg Tyr Gln
2630 2635 2640

Asn Arg Phe Leu His Leu Leu Gly Asn Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Asn Met
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly
2705 2710

<210> 203
<211> 2710
<212> PRT
<213> Artificial Sequence

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<220>
<223> Synthetic amino acid sequence

<400> 203

Gly Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1 5 10 15

Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
20 25 30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
35 40 45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr
50 55 60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65 70 75 80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Ala Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
100 105 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
115 120 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
130 135 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145 150 155 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
165 170 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
180 185 190

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Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Ala Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
    290                 295                 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
                325                 330                 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
            340                 345                 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
        355                 360                 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
    370                 375                 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385                 390                 395                 400
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Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
                405                 410                 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
            420                 425                 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
        435                 440                 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
    450                 455                 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465                 470                 475                 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
                485                 490                 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
            500                 505                 510

Gln Gln Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
        515                 520                 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
    530                 535                 540

Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545                 550                 555                 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
                565                 570                 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
            580                 585                 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
        595                 600                 605
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Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
    610                 615                 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625                 630                 635                 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
                645                 650                 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
            660                 665                 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
        675                 680                 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
    690                 695                 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705                 710                 715                 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser
                725                 730                 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
            740                 745                 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
        755                 760                 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
    770                 775                 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785                 790                 795                 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
                805                 810                 815
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Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
            820                 825                 830

Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
        835                 840                 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
    850                 855                 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865                 870                 875                 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
                885                 890                 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
            900                 905                 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
        915                 920                 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
    930                 935                 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945                 950                 955                 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
                965                 970                 975

Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
            980                 985                 990

Ala Gln Leu Phe Ser Thr Gly Leu  Asn Thr Ile Tyr Asp  Ser Ile Gln
        995                 1000                1005

Leu Val  Asn Leu Ile Ser Asn  Ala Val Asn Asp Thr  Ile Asn Val
    1010                1015                1020
```

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```
Leu Pro  Thr Ile Thr Glu Gly  Ile Pro Ile Val Ser  Thr Ile Leu
    1025                1030                1035

Asp Gly  Ile Asn Leu Gly Ala  Ala Ile Lys Glu Leu  Leu Asp Glu
    1040                1045                1050

His Asp  Pro Leu Leu Lys Lys  Glu Leu Glu Ala Lys  Val Gly Val
    1055                1060                1065

Leu Ala  Ile Asn Met Ser Leu  Ser Ile Ala Ala Thr  Val Ala Ser
    1070                1075                1080

Ile Val  Gly Ile Gly Ala Glu  Val Thr Ile Phe Leu  Leu Pro Ile
    1085                1090                1095

Ala Gly  Ile Ser Ala Gly Ile  Pro Ser Leu Val Asn  Asn Glu Leu
    1100                1105                1110

Ile Leu  His Asp Lys Ala Thr  Ser Val Val Asn Tyr  Phe Asn His
    1115                1120                1125

Leu Ser  Glu Ser Lys Lys Tyr  Gly Pro Leu Lys Thr  Glu Asp Asp
    1130                1135                1140

Lys Ile  Leu Val Pro Ile Asp  Asp Leu Val Ile Ser  Glu Ile Asp
    1145                1150                1155

Phe Asn  Asn Asn Ser Ile Lys  Leu Gly Thr Cys Asn  Ile Leu Ala
    1160                1165                1170

Met Glu  Gly Gly Ser Gly His  Thr Val Thr Gly Asn  Ile Asp His
    1175                1180                1185

Phe Phe  Ser Ser Pro Ser Ile  Ser Ser His Ile Pro  Ser Leu Ser
    1190                1195                1200

Ile Tyr  Ser Ala Ile Gly Ile  Glu Thr Glu Asn Leu  Asp Phe Ser
    1205                1210                1215
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Lys Lys  Ile Met Met Leu Pro  Asn Ala Pro Ser Arg  Val Phe Trp
    1220                1225                1230

Trp Glu  Thr Gly Ala Val Pro  Gly Leu Arg Ser Leu  Glu Asn Asp
    1235                1240                1245

Gly Thr  Arg Leu Leu Asp Ser  Ile Arg Asp Leu Tyr  Pro Gly Lys
    1250                1255                1260

Phe Tyr  Trp Arg Phe Tyr Ala  Phe Phe Asp Tyr Ala  Ile Thr Thr
    1265                1270                1275

Leu Lys  Pro Val Tyr Glu Asp  Thr Asn Ile Lys Ile  Lys Leu Asp
    1280                1285                1290

Lys Asp  Thr Arg Asn Phe Ile  Met Pro Thr Ile Thr  Thr Asn Glu
    1295                1300                1305

Ile Arg  Asn Lys Leu Ser Tyr  Ser Phe Asp Gly Ala  Gly Gly Thr
    1310                1315                1320

Tyr Ser  Leu Leu Leu Ser Ser  Tyr Pro Ile Ser Thr  Asn Ile Asn
    1325                1330                1335

Leu Ser  Lys Asp Asp Leu Trp  Ile Phe Asn Ile Asp  Asn Glu Val
    1340                1345                1350

Arg Glu  Ile Ser Ile Glu Asn  Gly Thr Ile Lys Lys  Gly Lys Leu
    1355                1360                1365

Ile Lys  Asp Val Leu Ser Lys  Ile Asp Ile Asn Lys  Asn Lys Leu
    1370                1375                1380

Ile Ile  Gly Asn Gln Thr Ile  Asp Phe Ser Gly Asp  Ile Asp Asn
    1385                1390                1395

Lys Asp  Arg Tyr Ile Phe Leu  Thr Cys Glu Leu Asp  Asp Lys Ile
    1400                1405                1410
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Ser Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu
1415 1420 1425

Leu Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn
1430 1435 1440

Thr Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile
1445 1450 1455

Ala Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala
1460 1465 1470

Ile Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp
1475 1480 1485

Ser Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe
1490 1495 1500

Asn Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys
1505 1510 1515

Asp Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn
1520 1525 1530

Thr Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn
1535 1540 1545

Gln Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser
1550 1555 1560

Ser Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr
1565 1570 1575

Ser Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys
1580 1585 1590

Leu Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe
1595 1600 1605

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```
Thr Leu  Val Gly Lys Thr Asn  Leu Gly Tyr Val Glu  Phe Ile Cys
    1610                1615                1620

Asp Asn  Asn Lys Asn Ile Asp  Ile Tyr Phe Gly Glu  Trp Lys Thr
    1625                1630                1635

Ser Ser  Ser Lys Ser Thr Ile  Phe Ser Gly Asn Gly  Arg Asn Val
    1640                1645                1650

Val Val  Glu Pro Ile Tyr Asn  Pro Asp Thr Gly Glu  Asp Ile Ser
    1655                1660                1665

Thr Ser  Leu Asp Phe Ser Tyr  Glu Pro Leu Tyr Gly  Ile Asp Arg
    1670                1675                1680

Tyr Ile  Asn Lys Val Leu Ile  Ala Pro Asp Leu Tyr  Thr Ser Leu
    1685                1690                1695

Ile Asn  Ile Asn Thr Asn Tyr  Tyr Ser Asn Glu Tyr  Tyr Pro Glu
    1700                1705                1710

Ile Ile  Val Leu Asn Pro Asn  Thr Phe His Lys Lys  Val Asn Ile
    1715                1720                1725

Asn Leu  Asp Ser Ser Ser Phe  Glu Tyr Lys Trp Ser  Thr Glu Gly
    1730                1735                1740

Ser Asp  Phe Ile Leu Val Arg  Tyr Leu Glu Glu Ser  Asn Lys Lys
    1745                1750                1755

Ile Leu  Gln Lys Ile Arg Ile  Lys Gly Ile Leu Ser  Asn Thr Gln
    1760                1765                1770

Ser Phe  Asn Lys Met Ser Ile  Asp Phe Lys Asp Ile  Lys Lys Leu
    1775                1780                1785

Ser Leu  Gly Tyr Ile Met Ser  Asn Phe Lys Ser Phe  Asn Ser Glu
    1790                1795                1800
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```
Asn Glu  Leu Asp Arg Asp His  Leu Gly Phe Lys Ile  Ile Asp Asn
    1805                 1810                 1815

Lys Thr  Tyr Tyr Tyr Asp Glu  Asp Ser Lys Leu Val  Lys Gly Leu
    1820                 1825                 1830

Ile Asn  Ile Asn Asn Ser Leu  Phe Tyr Phe Asp Pro  Ile Glu Phe
    1835                 1840                 1845

Asn Leu  Val Thr Gly Trp Gln  Thr Ile Asn Gly Lys  Lys Tyr Tyr
    1850                 1855                 1860

Phe Asp  Ile Asn Thr Gly Ala  Ala Leu Thr Ser Tyr  Lys Ile Ile
    1865                 1870                 1875

Asn Gly  Lys His Phe Tyr Phe  Asn Asn Asp Gly Val  Met Gln Leu
    1880                 1885                 1890

Gly Val  Phe Lys Gly Pro Asp  Gly Phe Glu Tyr Phe  Ala Pro Ala
    1895                 1900                 1905

Asn Thr  Gln Asn Asn Asn Ile  Glu Gly Gln Ala Ile  Val Tyr Gln
    1910                 1915                 1920

Ser Lys  Phe Leu Thr Leu Asn  Gly Lys Lys Tyr Tyr  Phe Asp Asn
    1925                 1930                 1935

Asn Ser  Lys Ala Val Thr Gly  Trp Arg Ile Ile Asn  Asn Glu Lys
    1940                 1945                 1950

Tyr Tyr  Phe Asn Pro Asn Asn  Ala Ile Ala Ala Val  Gly Leu Gln
    1955                 1960                 1965

Val Ile  Asp Asn Asn Lys Tyr  Tyr Phe Asn Pro Asp  Thr Ala Ile
    1970                 1975                 1980

Ile Ser  Lys Gly Trp Gln Thr  Val Asn Gly Ser Arg  Tyr Tyr Phe
    1985                 1990                 1995
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Asp Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp
2000 2005 2010

Gly Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly
2015 2020 2025

Val Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2030 2035 2040

Thr Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
2045 2050 2055

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
2060 2065 2070

Ser Lys Ala Val Thr Gly Leu Gln Thr Ile Asp Ser Lys Lys Tyr
2075 2080 2085

Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr
2090 2095 2100

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala
2105 2110 2115

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2120 2125 2130

Thr Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
2135 2140 2145

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2150 2155 2160

Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2165 2170 2175

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu
2180 2185 2190

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Phe Leu  Thr Leu Asn Gly Lys  Lys Tyr Tyr Phe Gly  Ser Asp Ser
    2195                2200                2205

Lys Ala  Val Thr Gly Trp Arg  Ile Ile Asn Asn Lys  Lys Tyr Tyr
    2210                2215                2220

Phe Asn  Pro Asn Asn Ala Ile  Ala Ala Ile His Leu  Cys Thr Ile
    2225                2230                2235

Asn Asn  Asp Lys Tyr Tyr Phe  Ser Tyr Asp Gly Ile  Leu Gln Asn
    2240                2245                2250

Gly Tyr  Ile Thr Ile Glu Arg  Asn Asn Phe Tyr Phe  Asp Ala Asn
    2255                2260                2265

Asn Glu  Ser Lys Met Val Thr  Gly Val Phe Lys Gly  Pro Asn Gly
    2270                2275                2280

Phe Glu  Tyr Phe Ala Pro Ala  Asn Thr His Asn Asn  Asn Ile Glu
    2285                2290                2295

Gly Gln  Ala Ile Val Tyr Gln  Asn Lys Phe Leu Thr  Leu Asn Gly
    2300                2305                2310

Lys Lys  Tyr Tyr Phe Asp Asn  Asp Ser Lys Ala Val  Thr Gly Trp
    2315                2320                2325

Gln Thr  Ile Asp Gly Lys Lys  Tyr Tyr Phe Asn Leu  Asn Thr Ala
    2330                2335                2340

Glu Ala  Ala Thr Gly Trp Gln  Thr Ile Asp Gly Lys  Lys Tyr Tyr
    2345                2350                2355

Phe Asn  Leu Asn Thr Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile
    2360                2365                2370

Asp Gly  Lys Lys Tyr Tyr Phe  Asn Thr Asn Thr Phe  Ile Ala Ser
    2375                2380                2385
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Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr
2390 2395 2400

Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe
2405 2410 2415

Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly
2420 2425 2430

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2435 2440 2445

Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg
2450 2455 2460

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val
2465 2470 2475

Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
2480 2485 2490

Asn Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser
2495 2500 2505

Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly
2510 2515 2520

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2525 2530 2535

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2540 2545 2550

Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn
2555 2560 2565

Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr
2570 2575 2580

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Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr
2585 2590 2595

Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile
2600 2605 2610

Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala
2615 2620 2625

Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln
2630 2635 2640

Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly
2705 2710

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<223> Synthetic amino acid sequence

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Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu

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            20                  25                  30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
        35                  40                  45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr
    50                  55                  60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65                  70                  75                  80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
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225 230 235 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile

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435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
530 535 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545 550 555 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
565 570 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
580 585 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
595 600 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
610 615 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625 630 635 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys

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645 650 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
660 665 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
675 680 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr
690 695 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705 710 715 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
725 730 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
740 745 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
755 760 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
770 775 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785 790 795 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
805 810 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
820 825 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
835 840 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu

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850 855 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865 870 875 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
885 890 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
900 905 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
915 920 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
930 935 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945 950 955 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
965 970 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
980 985 990

Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln Leu
995 1000 1005

Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val Leu
1010 1015 1020

Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu Asp
1025 1030 1035

Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu His
1040 1045 1050

Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val Leu

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1055 1060 1065

Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser Ile
1070 1075 1080

Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile Ala
1085 1090 1095

Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile
1100 1105 1110

Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu
1115 1120 1125

Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys
1130 1135 1140

Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly
1235 1240 1245

Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe

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1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile
1355 1360 1365

Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala

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1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val

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1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn

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1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr

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2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Leu Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn

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2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
2330 2335 2340

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln

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2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn

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2615 2620 2625

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

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<211> 2709
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<213> Artificial Sequence

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<223> Synthetic amino acid sequence

<400> 205

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
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Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

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Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Ala Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270
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Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480
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Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Gln Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
    530                 535                 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545                 550                 555                 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
        595                 600                 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
    610                 615                 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625                 630                 635                 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
                645                 650                 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
            660                 665                 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
        675                 680                 685
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```
Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr
    690                 695                 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705                 710                 715                 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
                725                 730                 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
            740                 745                 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
        755                 760                 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
    770                 775                 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785                 790                 795                 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
                805                 810                 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
            820                 825                 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
        835                 840                 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
    850                 855                 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865                 870                 875                 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
                885                 890                 895
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```
Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
            900                 905                 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
        915                 920                 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
    930                 935                 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945                 950                 955                 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
                965                 970                 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
            980                 985                 990

Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Tyr Asp Ser  Ile Gln Leu
        995                 1000                1005

Val Asn  Leu Ile Ser Asn Ala  Val Asn Asp Thr Ile  Asn Val Leu
    1010                1015                1020

Pro Thr  Ile Thr Glu Gly Ile  Pro Ile Val Ser Thr  Ile Leu Asp
    1025                1030                1035

Gly Ile  Asn Leu Gly Ala Ala  Ile Lys Glu Leu Leu  Asp Glu His
    1040                1045                1050

Asp Pro  Leu Leu Lys Lys Glu  Leu Glu Ala Lys Val  Gly Val Leu
    1055                1060                1065

Ala Ile  Asn Met Ser Leu Ser  Ile Ala Ala Thr Val  Ala Ser Ile
    1070                1075                1080

Val Gly  Ile Gly Ala Glu Val  Thr Ile Phe Leu Leu  Pro Ile Ala
    1085                1090                1095
```

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```
Gly Ile  Ser Ala Gly Ile Pro  Ser Leu Val Asn Asn  Glu Leu Ile
    1100                1105                1110

Leu His  Asp Lys Ala Thr Ser  Val Val Asn Tyr Phe  Asn His Leu
    1115                1120                1125

Ser Glu  Ser Lys Lys Tyr Gly  Pro Leu Lys Thr Glu  Asp Asp Lys
    1130                1135                1140

Ile Leu  Val Pro Ile Asp Asp  Leu Val Ile Ser Glu  Ile Asp Phe
    1145                1150                1155

Asn Asn  Asn Ser Ile Lys Leu  Gly Thr Cys Asn Ile  Leu Ala Met
    1160                1165                1170

Glu Gly  Gly Ser Gly His Thr  Val Thr Gly Asn Ile  Asp His Phe
    1175                1180                1185

Phe Ser  Ser Pro Ser Ile Ser  Ser His Ile Pro Ser  Leu Ser Ile
    1190                1195                1200

Tyr Ser  Ala Ile Gly Ile Glu  Thr Glu Asn Leu Asp  Phe Ser Lys
    1205                1210                1215

Lys Ile  Met Met Leu Pro Asn  Ala Pro Ser Arg Val  Phe Trp Trp
    1220                1225                1230

Glu Thr  Gly Ala Val Pro Gly  Leu Arg Ser Leu Glu  Asn Asp Gly
    1235                1240                1245

Thr Arg  Leu Leu Asp Ser Ile  Arg Asp Leu Tyr Pro  Gly Lys Phe
    1250                1255                1260

Tyr Trp  Arg Phe Tyr Ala Phe  Phe Asp Tyr Ala Ile  Thr Thr Leu
    1265                1270                1275

Lys Pro  Val Tyr Glu Asp Thr  Asn Ile Lys Ile Lys  Leu Asp Lys
    1280                1285                1290
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```
Asp Thr  Arg Asn Phe Ile Met  Pro Thr Ile Thr Thr  Asn Glu Ile
    1295                1300                1305

Arg Asn  Lys Leu Ser Tyr Ser  Phe Asp Gly Ala Gly  Gly Thr Tyr
    1310                1315                1320

Ser Leu  Leu Leu Ser Ser Tyr  Pro Ile Ser Thr Asn  Ile Asn Leu
    1325                1330                1335

Ser Lys  Asp Asp Leu Trp Ile  Phe Asn Ile Asp Asn  Glu Val Arg
    1340                1345                1350

Glu Ile  Ser Ile Glu Asn Gly  Thr Ile Lys Lys Gly  Lys Leu Ile
    1355                1360                1365

Lys Asp  Val Leu Ser Lys Ile  Asp Ile Asn Lys Asn  Lys Leu Ile
    1370                1375                1380

Ile Gly  Asn Gln Thr Ile Asp  Phe Ser Gly Asp Ile  Asp Asn Lys
    1385                1390                1395

Asp Arg  Tyr Ile Phe Leu Thr  Cys Glu Leu Asp Asp  Lys Ile Ser
    1400                1405                1410

Leu Ile  Ile Glu Ile Asn Leu  Val Ala Lys Ser Tyr  Ser Leu Leu
    1415                1420                1425

Leu Ser  Gly Asp Lys Asn Tyr  Leu Ile Ser Asn Leu  Ser Asn Thr
    1430                1435                1440

Ile Glu  Lys Ile Asn Thr Leu  Gly Leu Asp Ser Lys  Asn Ile Ala
    1445                1450                1455

Tyr Asn  Tyr Thr Asp Glu Ser  Asn Asn Lys Tyr Phe  Gly Ala Ile
    1460                1465                1470

Ser Lys  Thr Ser Gln Lys Ser  Ile Ile His Tyr Lys  Lys Asp Ser
    1475                1480                1485
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```
Lys Asn  Ile Leu Glu Phe Tyr  Asn Asp Ser Thr Leu  Glu Phe Asn
    1490                 1495                 1500

Ser Lys  Asp Phe Ile Ala Glu  Asp Ile Asn Val Phe  Met Lys Asp
    1505                 1510                 1515

Asp Ile  Asn Thr Ile Thr Gly  Lys Tyr Tyr Val Asp  Asn Asn Thr
    1520                 1525                 1530

Asp Lys  Ser Ile Asp Phe Ser  Ile Ser Leu Val Ser  Lys Asn Gln
    1535                 1540                 1545

Val Lys  Val Asn Gly Leu Tyr  Leu Asn Glu Ser Val  Tyr Ser Ser
    1550                 1555                 1560

Tyr Leu  Asp Phe Val Lys Asn  Ser Asp Gly His His  Asn Thr Ser
    1565                 1570                 1575

Asn Phe  Met Asn Leu Phe Leu  Asp Asn Ile Ser Phe  Trp Lys Leu
    1580                 1585                 1590

Phe Gly  Phe Glu Asn Ile Asn  Phe Val Ile Asp Lys  Tyr Phe Thr
    1595                 1600                 1605

Leu Val  Gly Lys Thr Asn Leu  Gly Tyr Val Glu Phe  Ile Cys Asp
    1610                 1615                 1620

Asn Asn  Lys Asn Ile Asp Ile  Tyr Phe Gly Glu Trp  Lys Thr Ser
    1625                 1630                 1635

Ser Ser  Lys Ser Thr Ile Phe  Ser Gly Asn Gly Arg  Asn Val Val
    1640                 1645                 1650

Val Glu  Pro Ile Tyr Asn Pro  Asp Thr Gly Glu Asp  Ile Ser Thr
    1655                 1660                 1665

Ser Leu  Asp Phe Ser Tyr Glu  Pro Leu Tyr Gly Ile  Asp Arg Tyr
    1670                 1675                 1680
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Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

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Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

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```
Lys Ala  Val Thr Gly Leu Gln  Thr Ile Asp Ser Lys  Lys Tyr Tyr
    2075                2080                2085

Phe Asn  Thr Asn Thr Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile
    2090                2095                2100

Asp Gly  Lys Lys Tyr Tyr Phe  Asn Thr Asn Thr Ala  Glu Ala Ala
    2105                2110                2115

Thr Gly  Trp Gln Thr Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr
    2120                2125                2130

Asn Thr  Ala Ile Ala Ser Thr  Gly Tyr Thr Ile Ile  Asn Gly Lys
    2135                2140                2145

His Phe  Tyr Phe Asn Thr Asp  Gly Ile Met Gln Ile  Gly Val Phe
    2150                2155                2160

Lys Gly  Pro Asn Gly Phe Glu  Tyr Phe Ala Pro Ala  Asn Thr Asp
    2165                2170                2175

Ala Asn  Asn Ile Glu Gly Gln  Ala Ile Leu Tyr Gln  Asn Glu Phe
    2180                2185                2190

Leu Thr  Leu Asn Gly Lys Lys  Tyr Tyr Phe Gly Ser  Asp Ser Lys
    2195                2200                2205

Ala Val  Thr Gly Trp Arg Ile  Ile Asn Asn Lys Lys  Tyr Tyr Phe
    2210                2215                2220

Asn Pro  Asn Asn Ala Ile Ala  Ala Ile His Leu Cys  Thr Ile Asn
    2225                2230                2235

Asn Asp  Lys Tyr Tyr Phe Ser  Tyr Asp Gly Ile Leu  Gln Asn Gly
    2240                2245                2250

Tyr Ile  Thr Ile Glu Arg Asn  Asn Phe Tyr Phe Asp  Ala Asn Asn
    2255                2260                2265
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Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
2330 2335 2340

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

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```
Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr Asn Thr  Ala Val Ala
    2465                2470                2475

Val Thr  Gly Trp Gln Thr Ile  Asn Gly Lys Lys Tyr  Tyr Phe Asn
    2480                2485                2490

Thr Asn  Thr Ser Ile Ala Ser  Thr Gly Tyr Thr Ile  Ile Ser Gly
    2495                2500                2505

Lys His  Phe Tyr Phe Asn Thr  Asp Gly Ile Met Gln  Ile Gly Val
    2510                2515                2520

Phe Lys  Gly Pro Asp Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr
    2525                2530                2535

Asp Ala  Asn Asn Ile Glu Gly  Gln Ala Ile Arg Tyr  Gln Asn Arg
    2540                2545                2550

Phe Leu  Tyr Leu His Asp Asn  Ile Tyr Tyr Phe Gly  Asn Asn Ser
    2555                2560                2565

Lys Ala  Ala Thr Gly Trp Val  Thr Ile Asp Gly Asn  Arg Tyr Tyr
    2570                2575                2580

Phe Glu  Pro Asn Thr Ala Met  Gly Ala Asn Gly Tyr  Lys Thr Ile
    2585                2590                2595

Asp Asn  Lys Asn Phe Tyr Phe  Arg Asn Gly Leu Pro  Gln Ile Gly
    2600                2605                2610

Val Phe  Lys Gly Ser Asn Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2615                2620                2625

Thr Asp  Ala Asn Asn Ile Glu  Gly Gln Ala Ile Arg  Tyr Gln Asn
    2630                2635                2640

Arg Phe  Leu His Leu Leu Gly  Lys Ile Tyr Tyr Phe  Gly Asn Asn
    2645                2650                2655
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Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

<210> 206
<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 206

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Ala Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr

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            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
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305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Gln Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
```

515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
530 535 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545 550 555 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
565 570 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
580 585 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
595 600 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
610 615 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625 630 635 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
645 650 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
660 665 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
675 680 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr
690 695 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705 710 715 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile

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725 730 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
740 745 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
755 760 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
770 775 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785 790 795 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
805 810 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
820 825 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
835 840 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
850 855 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865 870 875 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
885 890 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
900 905 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
915 920 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn

930 935 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945 950 955 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
965 970 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
980 985 990

Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln Leu
995 1000 1005

Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val Leu
1010 1015 1020

Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu Asp
1025 1030 1035

Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu His
1040 1045 1050

Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val Leu
1055 1060 1065

Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser Ile
1070 1075 1080

Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile Ala
1085 1090 1095

Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile
1100 1105 1110

Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu
1115 1120 1125

Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys

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1130 1135 1140

Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly
1235 1240 1245

Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu

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1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile
1355 1360 1365

Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr

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1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn

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1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser

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1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Leu Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala

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2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys

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2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
2330 2335 2340

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly

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2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys

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2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

<210> 207
<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 207

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Ala Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
130 135 140

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Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350
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Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Gln Ile Asn Ala Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
    530                 535                 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545                 550                 555                 560
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Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
        595                 600                 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
    610                 615                 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625                 630                 635                 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
                645                 650                 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
            660                 665                 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
        675                 680                 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr
    690                 695                 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705                 710                 715                 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
                725                 730                 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
            740                 745                 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
        755                 760                 765
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Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
    770                 775                 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785                 790                 795                 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
                805                 810                 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
            820                 825                 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
        835                 840                 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
    850                 855                 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865                 870                 875                 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
                885                 890                 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
            900                 905                 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
        915                 920                 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
    930                 935                 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945                 950                 955                 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
                965                 970                 975
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Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
            980                 985                 990

Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Tyr Asp Ser  Ile Gln Leu
        995                 1000                1005

Val Asn  Leu Ile Ser Asn Ala  Val Asn Asp Thr Ile  Asn Val Leu
    1010                1015                1020

Pro Thr  Ile Thr Glu Gly Ile  Pro Ile Val Ser Thr  Ile Leu Asp
    1025                1030                1035

Gly Ile  Asn Leu Gly Ala Ala  Ile Lys Glu Leu Leu  Asp Glu His
    1040                1045                1050

Asp Pro  Leu Leu Lys Lys Glu  Leu Glu Ala Lys Val  Gly Val Leu
    1055                1060                1065

Ala Ile  Asn Met Ser Leu Ser  Ile Ala Ala Thr Val  Ala Ser Ile
    1070                1075                1080

Val Gly  Ile Gly Ala Glu Val  Thr Ile Phe Leu Leu  Pro Ile Ala
    1085                1090                1095

Gly Ile  Ser Ala Gly Ile Pro  Ser Leu Val Asn Asn  Glu Leu Ile
    1100                1105                1110

Leu His  Asp Lys Ala Thr Ser  Val Val Asn Tyr Phe  Asn His Leu
    1115                1120                1125

Ser Glu  Ser Lys Lys Tyr Gly  Pro Leu Lys Thr Glu  Asp Asp Lys
    1130                1135                1140

Ile Leu  Val Pro Ile Asp Asp  Leu Val Ile Ser Glu  Ile Asp Phe
    1145                1150                1155

Asn Asn  Asn Ser Ile Lys Leu  Gly Thr Cys Asn Ile  Leu Ala Met
    1160                1165                1170
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Glu Gly  Gly Ser Gly His Thr  Val Thr Gly Asn Ile  Asp His Phe
    1175                1180                1185

Phe Ser  Ser Pro Ser Ile Ser  Ser His Ile Pro Ser  Leu Ser Ile
    1190                1195                1200

Tyr Ser  Ala Ile Gly Ile Glu  Thr Glu Asn Leu Asp  Phe Ser Lys
    1205                1210                1215

Lys Ile  Met Met Leu Pro Asn  Ala Pro Ser Arg Val  Phe Trp Trp
    1220                1225                1230

Glu Thr  Gly Ala Val Pro Gly  Leu Arg Ser Leu Glu  Asn Asp Gly
    1235                1240                1245

Thr Arg  Leu Leu Asp Ser Ile  Arg Asp Leu Tyr Pro  Gly Lys Phe
    1250                1255                1260

Tyr Trp  Arg Phe Tyr Ala Phe  Phe Asp Tyr Ala Ile  Thr Thr Leu
    1265                1270                1275

Lys Pro  Val Tyr Glu Asp Thr  Asn Ile Lys Ile Lys  Leu Asp Lys
    1280                1285                1290

Asp Thr  Arg Asn Phe Ile Met  Pro Thr Ile Thr Thr  Asn Glu Ile
    1295                1300                1305

Arg Asn  Lys Leu Ser Tyr Ser  Phe Asp Gly Ala Gly  Gly Thr Tyr
    1310                1315                1320

Ser Leu  Leu Leu Ser Ser Tyr  Pro Ile Ser Thr Asn  Ile Asn Leu
    1325                1330                1335

Ser Lys  Asp Asp Leu Trp Ile  Phe Asn Ile Asp Asn  Glu Val Arg
    1340                1345                1350

Glu Ile  Ser Ile Glu Asn Gly  Thr Ile Lys Lys Gly  Lys Leu Ile
    1355                1360                1365
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Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

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Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

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Leu Gln  Lys Ile Arg Ile Lys  Gly Ile Leu Ser Asn  Thr Gln Ser
    1760                1765                1770

Phe Asn  Lys Met Ser Ile Asp  Phe Lys Asp Ile Lys  Lys Leu Ser
    1775                1780                1785

Leu Gly  Tyr Ile Met Ser Asn  Phe Lys Ser Phe Asn  Ser Glu Asn
    1790                1795                1800

Glu Leu  Asp Arg Asp His Leu  Gly Phe Lys Ile Ile  Asp Asn Lys
    1805                1810                1815

Thr Tyr  Tyr Tyr Asp Glu Asp  Ser Lys Leu Val Lys  Gly Leu Ile
    1820                1825                1830

Asn Ile  Asn Asn Ser Leu Phe  Tyr Phe Asp Pro Ile  Glu Phe Asn
    1835                1840                1845

Leu Val  Thr Gly Trp Gln Thr  Ile Asn Gly Lys Lys  Tyr Tyr Phe
    1850                1855                1860

Asp Ile  Asn Thr Gly Ala Ala  Leu Thr Ser Tyr Lys  Ile Ile Asn
    1865                1870                1875

Gly Lys  His Phe Tyr Phe Asn  Asn Asp Gly Val Met  Gln Leu Gly
    1880                1885                1890

Val Phe  Lys Gly Pro Asp Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    1895                1900                1905

Thr Gln  Asn Asn Asn Ile Glu  Gly Gln Ala Ile Val  Tyr Gln Ser
    1910                1915                1920

Lys Phe  Leu Thr Leu Asn Gly  Lys Lys Tyr Tyr Phe  Asp Asn Asn
    1925                1930                1935

Ser Lys  Ala Val Thr Gly Trp  Arg Ile Ile Asn Asn  Glu Lys Tyr
    1940                1945                1950
```

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```
Tyr Phe  Asn Pro Asn Asn Ala  Ile Ala Ala Val Gly  Leu Gln Val
    1955                1960                1965

Ile Asp  Asn Asn Lys Tyr Tyr  Phe Asn Pro Asp Thr  Ala Ile Ile
    1970                1975                1980

Ser Lys  Gly Trp Gln Thr Val  Asn Gly Ser Arg Tyr  Tyr Phe Asp
    1985                1990                1995

Thr Asp  Thr Ala Ile Ala Phe  Asn Gly Tyr Lys Thr  Ile Asp Gly
    2000                2005                2010

Lys His  Phe Tyr Phe Asp Ser  Asp Cys Val Val Lys  Ile Gly Val
    2015                2020                2025

Phe Ser  Thr Ser Asn Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr
    2030                2035                2040

Tyr Asn  Asn Asn Ile Glu Gly  Gln Ala Ile Val Tyr  Gln Ser Lys
    2045                2050                2055

Phe Leu  Thr Leu Asn Gly Lys  Lys Tyr Tyr Phe Asp  Asn Asn Ser
    2060                2065                2070

Lys Ala  Val Thr Gly Leu Gln  Thr Ile Asp Ser Lys  Lys Tyr Tyr
    2075                2080                2085

Phe Asn  Thr Asn Thr Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile
    2090                2095                2100

Asp Gly  Lys Lys Tyr Tyr Phe  Asn Thr Asn Thr Ala  Glu Ala Ala
    2105                2110                2115

Thr Gly  Trp Gln Thr Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr
    2120                2125                2130

Asn Thr  Ala Ile Ala Ser Thr  Gly Tyr Thr Ile Ile  Asn Gly Lys
    2135                2140                2145
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```
His Phe  Tyr Phe Asn Thr Asp  Gly Ile Met Gln Ile  Gly Val Phe
    2150                2155                2160

Lys Gly  Pro Asn Gly Phe Glu  Tyr Phe Ala Pro Ala  Asn Thr Asp
    2165                2170                2175

Ala Asn  Asn Ile Glu Gly Gln  Ala Ile Leu Tyr Gln  Asn Glu Phe
    2180                2185                2190

Leu Thr  Leu Asn Gly Lys Lys  Tyr Tyr Phe Gly Ser  Asp Ser Lys
    2195                2200                2205

Ala Val  Thr Gly Trp Arg Ile  Ile Asn Asn Lys Lys  Tyr Tyr Phe
    2210                2215                2220

Asn Pro  Asn Asn Ala Ile Ala  Ala Ile His Leu Cys  Thr Ile Asn
    2225                2230                2235

Asn Asp  Lys Tyr Tyr Phe Ser  Tyr Asp Gly Ile Leu  Gln Asn Gly
    2240                2245                2250

Tyr Ile  Thr Ile Glu Arg Asn  Asn Phe Tyr Phe Asp  Ala Asn Asn
    2255                2260                2265

Glu Ser  Lys Met Val Thr Gly  Val Phe Lys Gly Pro  Asn Gly Phe
    2270                2275                2280

Glu Tyr  Phe Ala Pro Ala Asn  Thr His Asn Asn Asn  Ile Glu Gly
    2285                2290                2295

Gln Ala  Ile Val Tyr Gln Asn  Lys Phe Leu Thr Leu  Asn Gly Lys
    2300                2305                2310

Lys Tyr  Tyr Phe Asp Asn Asp  Ser Lys Ala Val Thr  Gly Trp Gln
    2315                2320                2325

Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn Leu Asn  Thr Ala Glu
    2330                2335                2340
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Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

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Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

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<211> 2709
<212> PRT

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<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 208

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            20                  25                  30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Ala Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
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180 185 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
195 200 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
210 215 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225 230 235 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Ala Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln

385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Gln Ile Asn Ser Leu Ala Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
530 535 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545 550 555 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
565 570 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
580 585 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile

595 600 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
610 615 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625 630 635 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
645 650 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
660 665 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
675 680 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr
690 695 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705 710 715 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
725 730 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
740 745 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
755 760 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
770 775 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785 790 795 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro

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805 810 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
820 825 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
835 840 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
850 855 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865 870 875 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
885 890 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
900 905 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
915 920 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
930 935 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945 950 955 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
965 970 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
980 985 990

Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln Leu
995 1000 1005

Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val Leu

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1010 1015 1020

Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu Asp
1025 1030 1035

Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu His
1040 1045 1050

Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val Leu
1055 1060 1065

Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser Ile
1070 1075 1080

Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile Ala
1085 1090 1095

Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile
1100 1105 1110

Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu
1115 1120 1125

Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys
1130 1135 1140

Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser Lys

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1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly
1235 1240 1245

Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile
1355 1360 1365

Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser

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1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr

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1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn

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1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp

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1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Leu Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe

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2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
2330 2335 2340

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr

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2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr

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2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

<210> 209
<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 209

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

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Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
            20                  25                  30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Ala Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
    210                 215                 220
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Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Pro Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430
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```
Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Gln Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
    530                 535                 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545                 550                 555                 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
        595                 600                 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
    610                 615                 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625                 630                 635                 640
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Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
645 650 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
660 665 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
675 680 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr
690 695 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705 710 715 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser Ile
725 730 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
740 745 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
755 760 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
770 775 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785 790 795 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
805 810 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
820 825 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
835 840 845

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Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
    850                 855                 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865                 870                 875                 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
                885                 890                 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
            900                 905                 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
        915                 920                 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
    930                 935                 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945                 950                 955                 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
                965                 970                 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
            980                 985                 990

Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Tyr Asp Ser  Ile Gln Leu
        995                 1000                1005

Val Asn  Leu Ile Ser Asn Ala  Val Asn Asp Thr Ile  Asn Val Leu
    1010                1015                1020

Pro Thr  Ile Thr Glu Gly Ile  Pro Ile Val Ser Thr  Ile Leu Asp
    1025                1030                1035

Gly Ile  Asn Leu Gly Ala Ala  Ile Lys Glu Leu Leu  Asp Glu His
    1040                1045                1050
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```
Asp Pro  Leu Leu Lys Lys Glu  Leu Glu Ala Lys Val  Gly Val Leu
    1055                1060                1065

Ala Ile  Asn Met Ser Leu Ser  Ile Ala Ala Thr Val  Ala Ser Ile
    1070                1075                1080

Val Gly  Ile Gly Ala Glu Val  Thr Ile Phe Leu Leu  Pro Ile Ala
    1085                1090                1095

Gly Ile  Ser Ala Gly Ile Pro  Ser Leu Val Asn Asn  Glu Leu Ile
    1100                1105                1110

Leu His  Asp Lys Ala Thr Ser  Val Val Asn Tyr Phe  Asn His Leu
    1115                1120                1125

Ser Glu  Ser Lys Glu Tyr Gly  Pro Leu Lys Thr Glu  Asp Asp Lys
    1130                1135                1140

Ile Leu  Val Pro Ile Asp Asp  Leu Val Ile Ser Glu  Ile Asp Phe
    1145                1150                1155

Asn Asn  Asn Ser Ile Lys Leu  Gly Thr Cys Asn Ile  Leu Ala Met
    1160                1165                1170

Glu Gly  Gly Ser Gly His Thr  Val Thr Gly Asn Ile  Asp His Phe
    1175                1180                1185

Phe Ser  Ser Pro Tyr Ile Ser  Ser His Ile Pro Ser  Leu Ser Val
    1190                1195                1200

Tyr Ser  Ala Ile Gly Ile Lys  Thr Glu Asn Leu Asp  Phe Ser Lys
    1205                1210                1215

Lys Ile  Met Met Leu Pro Asn  Ala Pro Ser Arg Val  Phe Trp Trp
    1220                1225                1230

Glu Thr  Gly Ala Val Pro Gly  Leu Arg Ser Leu Glu  Asn Asn Gly
    1235                1240                1245
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```
Thr Lys  Leu Leu Asp Ser Ile  Arg Asp Leu Tyr Pro  Gly Lys Phe
    1250                1255                1260

Tyr Trp  Arg Phe Tyr Ala Phe  Phe Asp Tyr Ala Ile  Thr Thr Leu
    1265                1270                1275

Lys Pro  Val Tyr Glu Asp Thr  Asn Thr Lys Ile Lys  Leu Asp Lys
    1280                1285                1290

Asp Thr  Arg Asn Phe Ile Met  Pro Thr Ile Thr Thr  Asp Glu Ile
    1295                1300                1305

Arg Asn  Lys Leu Ser Tyr Ser  Phe Asp Gly Ala Gly  Gly Thr Tyr
    1310                1315                1320

Ser Leu  Leu Leu Ser Ser Tyr  Pro Ile Ser Met Asn  Ile Asn Leu
    1325                1330                1335

Ser Lys  Asp Asp Leu Trp Ile  Phe Asn Ile Asp Asn  Glu Val Arg
    1340                1345                1350

Glu Ile  Ser Ile Glu Asn Gly  Thr Ile Lys Lys Gly  Asn Leu Ile
    1355                1360                1365

Glu Asp  Val Leu Ser Lys Ile  Asp Ile Asn Lys Asn  Lys Leu Ile
    1370                1375                1380

Ile Gly  Asn Gln Thr Ile Asp  Phe Ser Gly Asp Ile  Asp Asn Lys
    1385                1390                1395

Asp Arg  Tyr Ile Phe Leu Thr  Cys Glu Leu Asp Asp  Lys Ile Ser
    1400                1405                1410

Leu Ile  Ile Glu Ile Asn Leu  Val Ala Lys Ser Tyr  Ser Leu Leu
    1415                1420                1425

Leu Ser  Gly Asp Lys Asn Tyr  Leu Ile Ser Asn Leu  Ser Asn Thr
    1430                1435                1440
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```
Ile Glu  Lys Ile Asn Thr Leu  Gly Leu Asp Ser Lys  Asn Ile Ala
    1445                1450                1455

Tyr Asn  Tyr Thr Asp Glu Ser  Asn Asn Lys Tyr Phe  Gly Ala Ile
    1460                1465                1470

Ser Lys  Thr Ser Gln Lys Ser  Ile Ile His Tyr Lys  Lys Asp Ser
    1475                1480                1485

Lys Asn  Ile Leu Glu Phe Tyr  Asn Gly Ser Thr Leu  Glu Phe Asn
    1490                1495                1500

Ser Lys  Asp Phe Ile Ala Glu  Asp Ile Asn Val Phe  Met Lys Asp
    1505                1510                1515

Asp Ile  Asn Thr Ile Thr Gly  Lys Tyr Tyr Val Asp  Asn Asn Thr
    1520                1525                1530

Asp Lys  Ser Ile Asp Phe Ser  Ile Ser Leu Val Ser  Lys Asn Gln
    1535                1540                1545

Val Lys  Val Asn Gly Leu Tyr  Leu Asn Glu Ser Val  Tyr Ser Ser
    1550                1555                1560

Tyr Leu  Asp Phe Val Lys Asn  Ser Asp Gly His His  Asn Thr Ser
    1565                1570                1575

Asn Phe  Met Asn Leu Phe Leu  Asn Asn Ile Ser Phe  Trp Lys Leu
    1580                1585                1590

Phe Gly  Phe Glu Asn Ile Asn  Phe Val Ile Asp Lys  Tyr Phe Thr
    1595                1600                1605

Leu Val  Gly Lys Thr Asn Leu  Gly Tyr Val Glu Phe  Ile Cys Asp
    1610                1615                1620

Asn Asn  Lys Asn Ile Asp Ile  Tyr Phe Gly Glu Trp  Lys Thr Ser
    1625                1630                1635
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Ser Ser  Lys Ser Thr Ile Phe  Ser Gly Asn Gly Arg  Asn Val Val
    1640                1645                1650

Val Glu  Pro Ile Tyr Asn Pro  Asp Thr Gly Glu Asp  Ile Ser Thr
    1655                1660                1665

Ser Leu  Asp Phe Ser Tyr Glu  Pro Leu Tyr Gly Ile  Asp Arg Tyr
    1670                1675                1680

Ile Asn  Lys Val Leu Ile Ala  Pro Asp Leu Tyr Thr  Ser Leu Ile
    1685                1690                1695

Asn Ile  Asn Thr Asn Tyr Tyr  Ser Asn Glu Tyr Tyr  Pro Glu Ile
    1700                1705                1710

Ile Val  Leu Asn Pro Asn Thr  Phe His Lys Lys Val  Asn Ile Asn
    1715                1720                1725

Leu Asp  Ser Ser Ser Phe Glu  Tyr Lys Trp Ser Thr  Glu Gly Ser
    1730                1735                1740

Asp Phe  Ile Leu Val Arg Tyr  Leu Glu Glu Ser Asn  Lys Lys Ile
    1745                1750                1755

Leu Gln  Lys Ile Arg Ile Lys  Gly Ile Leu Ser Asn  Thr Gln Ser
    1760                1765                1770

Phe Asn  Lys Met Ser Ile Asp  Phe Lys Asp Ile Lys  Lys Leu Ser
    1775                1780                1785

Leu Gly  Tyr Ile Met Ser Asn  Phe Lys Ser Phe Asn  Ser Glu Asn
    1790                1795                1800

Glu Leu  Asp Arg Asp His Leu  Gly Phe Lys Ile Ile  Asp Asn Lys
    1805                1810                1815

Thr Tyr  Tyr Tyr Asp Glu Asp  Ser Lys Leu Val Lys  Gly Leu Ile
    1820                1825                1830
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Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Ser Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Ser Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asn Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

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```
Phe Ser  Gly Ser Asn Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr
    2030                2035                2040

Tyr Asn  Asn Asn Ile Glu Gly  Gln Ala Ile Val Tyr  Gln Ser Lys
    2045                2050                2055

Phe Leu  Thr Leu Asn Gly Lys  Lys Tyr Tyr Phe Asp  Asn Asn Ser
    2060                2065                2070

Lys Ala  Val Thr Gly Trp Gln  Thr Ile Asp Ser Lys  Lys Tyr Tyr
    2075                2080                2085

Phe Asn  Thr Asn Thr Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile
    2090                2095                2100

Asp Gly  Lys Lys Tyr Tyr Phe  Asn Thr Asn Thr Ala  Glu Ala Ala
    2105                2110                2115

Thr Gly  Trp Gln Thr Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr
    2120                2125                2130

Asn Thr  Ser Ile Ala Ser Thr  Gly Tyr Thr Ile Ile  Asn Gly Lys
    2135                2140                2145

Tyr Phe  Tyr Phe Asn Thr Asp  Gly Ile Met Gln Ile  Gly Val Phe
    2150                2155                2160

Lys Val  Pro Asn Gly Phe Glu  Tyr Phe Ala Pro Ala  Asn Thr His
    2165                2170                2175

Asn Asn  Asn Ile Glu Gly Gln  Ala Ile Leu Tyr Gln  Asn Lys Phe
    2180                2185                2190

Leu Thr  Leu Asn Gly Lys Lys  Tyr Tyr Phe Gly Ser  Asp Ser Lys
    2195                2200                2205

Ala Ile  Thr Gly Trp Gln Thr  Ile Asp Gly Lys Lys  Tyr Tyr Phe
    2210                2215                2220
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Asn Pro  Asn Asn Ala Ile Ala  Ala Thr His Leu Cys  Thr Ile Asn
    2225                 2230                 2235

Asn Asp  Lys Tyr Tyr Phe Ser  Tyr Asp Gly Ile Leu  Gln Asn Gly
    2240                 2245                 2250

Tyr Ile  Thr Ile Glu Arg Asn  Asn Phe Tyr Phe Asp  Ala Asn Asn
    2255                 2260                 2265

Glu Ser  Lys Met Val Thr Gly  Val Phe Lys Gly Pro  Asn Gly Phe
    2270                 2275                 2280

Glu Tyr  Phe Ala Pro Ala Asn  Thr His Asn Asn Asn  Ile Glu Gly
    2285                 2290                 2295

Gln Ala  Ile Val Tyr Gln Asn  Lys Phe Leu Thr Leu  Asn Gly Lys
    2300                 2305                 2310

Lys Tyr  Tyr Phe Asp Asn Asp  Ser Lys Ala Val Thr  Gly Trp Gln
    2315                 2320                 2325

Thr Ile  Asp Ser Lys Lys Tyr  Tyr Phe Asn Leu Asn  Thr Ala Val
    2330                 2335                 2340

Ala Val  Thr Gly Trp Gln Thr  Ile Asp Gly Glu Lys  Tyr Tyr Phe
    2345                 2350                 2355

Asn Leu  Asn Thr Ala Glu Ala  Ala Thr Gly Trp Gln  Thr Ile Asp
    2360                 2365                 2370

Gly Lys  Arg Tyr Tyr Phe Asn  Thr Asn Thr Tyr Ile  Ala Ser Thr
    2375                 2380                 2385

Gly Tyr  Thr Ile Ile Asn Gly  Lys His Phe Tyr Phe  Asn Thr Asp
    2390                 2395                 2400

Gly Ile  Met Gln Ile Gly Val  Phe Lys Gly Pro Asp  Gly Phe Glu
    2405                 2410                 2415
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Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Tyr Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asp Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Ala Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

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Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Ser Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

<210> 210
<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 210

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser

50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Ala Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
130 135 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145 150 155 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
165 170 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
180 185 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
195 200 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
210 215 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225 230 235 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu

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260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Ala Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile

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465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Gln Ile Asn Ser Leu Ala Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
    530                 535                 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545                 550                 555                 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
        595                 600                 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
    610                 615                 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625                 630                 635                 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
                645                 650                 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
            660                 665                 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
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675 680 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
690 695 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705 710 715 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
725 730 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
740 745 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
755 760 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
770 775 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785 790 795 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
805 810 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
820 825 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
835 840 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
850 855 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865 870 875 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr

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885 890 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
900 905 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
915 920 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
930 935 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945 950 955 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
965 970 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
980 985 990

Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln Leu
995 1000 1005

Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val Leu
1010 1015 1020

Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu Asp
1025 1030 1035

Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu His
1040 1045 1050

Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val Leu
1055 1060 1065

Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser Ile
1070 1075 1080

Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile Ala

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1085 1090 1095

Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile
1100 1105 1110

Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu
1115 1120 1125

Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys
1130 1135 1140

Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly
1235 1240 1245

Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys

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1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile
1355 1360 1365

Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser

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1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr

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1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn

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1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser

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2060 2065 2070

Lys Ala Val Thr Gly Leu Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn

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2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
2330 2335 2340

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr

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2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn

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2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

<210> 211
<211> 718
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

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Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

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```
His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300
```

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```
Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510
```

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```
Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
    530                 535                 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545                 550                 555                 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
        595                 600                 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
    610                 615                 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625                 630                 635                 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
                645                 650                 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
            660                 665                 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
        675                 680                 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr
    690                 695                 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu
705                 710                 715
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<210> 212
<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<220>
<221> misc_feature
<222> (100)..(100)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> VARIANT
<222> (101)..(101)
<223> Xaa is any amino acid, but not Trp

<220>
<221> VARIANT
<222> (286)..(286)
<223> Xaa is any amino acid, but not Asp

<220>
<221> VARIANT
<222> (513)..(513)
<223> Xaa is any amino acid, but not Glu

<220>
<221> VARIANT
<222> (518)..(518)
<223> Xaa is any amino acid, but not Trp

<220>
<221> VARIANT
<222> (699)..(699)
<223> Xaa is any amino acid, but not Cys

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Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

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```
Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Xaa Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255
```

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```
Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Xaa Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460
```

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```
Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Xaa Ile Asn Ser Leu Xaa Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
    530                 535                 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545                 550                 555                 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
        595                 600                 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
    610                 615                 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625                 630                 635                 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
                645                 650                 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
            660                 665                 670
```

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```
Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
        675                 680                 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Xaa Asn Met Phe Ser Tyr
    690                 695                 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705                 710                 715                 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
                725                 730                 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
            740                 745                 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
        755                 760                 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
    770                 775                 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785                 790                 795                 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
                805                 810                 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
            820                 825                 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
        835                 840                 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
    850                 855                 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865                 870                 875                 880
```

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Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
885 890 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
900 905 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
915 920 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
930 935 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945 950 955 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
965 970 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
980 985 990

Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln Leu
995 1000 1005

Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val Leu
1010 1015 1020

Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu Asp
1025 1030 1035

Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu His
1040 1045 1050

Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val Leu
1055 1060 1065

Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser Ile
1070 1075 1080

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```
Val Gly  Ile Gly Ala Glu Val  Thr Ile Phe Leu Leu  Pro Ile Ala
    1085                1090                1095

Gly Ile  Ser Ala Gly Ile Pro  Ser Leu Val Asn Asn  Glu Leu Ile
    1100                1105                1110

Leu His  Asp Lys Ala Thr Ser  Val Val Asn Tyr Phe  Asn His Leu
    1115                1120                1125

Ser Glu  Ser Lys Lys Tyr Gly  Pro Leu Lys Thr Glu  Asp Asp Lys
    1130                1135                1140

Ile Leu  Val Pro Ile Asp Asp  Leu Val Ile Ser Glu  Ile Asp Phe
    1145                1150                1155

Asn Asn  Asn Ser Ile Lys Leu  Gly Thr Cys Asn Ile  Leu Ala Met
    1160                1165                1170

Glu Gly  Gly Ser Gly His Thr  Val Thr Gly Asn Ile  Asp His Phe
    1175                1180                1185

Phe Ser  Ser Pro Ser Ile Ser  Ser His Ile Pro Ser  Leu Ser Ile
    1190                1195                1200

Tyr Ser  Ala Ile Gly Ile Glu  Thr Glu Asn Leu Asp  Phe Ser Lys
    1205                1210                1215

Lys Ile  Met Met Leu Pro Asn  Ala Pro Ser Arg Val  Phe Trp Trp
    1220                1225                1230

Glu Thr  Gly Ala Val Pro Gly  Leu Arg Ser Leu Glu  Asn Asp Gly
    1235                1240                1245

Thr Arg  Leu Leu Asp Ser Ile  Arg Asp Leu Tyr Pro  Gly Lys Phe
    1250                1255                1260

Tyr Trp  Arg Phe Tyr Ala Phe  Phe Asp Tyr Ala Ile  Thr Thr Leu
    1265                1270                1275
```

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Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile
1355 1360 1365

Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

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Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

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Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

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```
Asp Ile  Asn Thr Gly Ala Ala  Leu Thr Ser Tyr Lys  Ile Ile Asn
    1865                1870                1875

Gly Lys  His Phe Tyr Phe Asn  Asn Asp Gly Val Met  Gln Leu Gly
    1880                1885                1890

Val Phe  Lys Gly Pro Asp Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    1895                1900                1905

Thr Gln  Asn Asn Asn Ile Glu  Gly Gln Ala Ile Val  Tyr Gln Ser
    1910                1915                1920

Lys Phe  Leu Thr Leu Asn Gly  Lys Lys Tyr Tyr Phe  Asp Asn Asn
    1925                1930                1935

Ser Lys  Ala Val Thr Gly Trp  Arg Ile Ile Asn Asn  Glu Lys Tyr
    1940                1945                1950

Tyr Phe  Asn Pro Asn Asn Ala  Ile Ala Ala Val Gly  Leu Gln Val
    1955                1960                1965

Ile Asp  Asn Asn Lys Tyr Tyr  Phe Asn Pro Asp Thr  Ala Ile Ile
    1970                1975                1980

Ser Lys  Gly Trp Gln Thr Val  Asn Gly Ser Arg Tyr  Tyr Phe Asp
    1985                1990                1995

Thr Asp  Thr Ala Ile Ala Phe  Asn Gly Tyr Lys Thr  Ile Asp Gly
    2000                2005                2010

Lys His  Phe Tyr Phe Asp Ser  Asp Cys Val Val Lys  Ile Gly Val
    2015                2020                2025

Phe Ser  Thr Ser Asn Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr
    2030                2035                2040

Tyr Asn  Asn Asn Ile Glu Gly  Gln Ala Ile Val Tyr  Gln Ser Lys
    2045                2050                2055
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Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Leu Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

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Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
2330 2335 2340

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

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```
Tyr Tyr  Phe Gly Ser Asp Ser  Lys Ala Val Thr Gly  Leu Arg Thr
    2450                 2455                 2460

Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr Asn Thr  Ala Val Ala
    2465                 2470                 2475

Val Thr  Gly Trp Gln Thr Ile  Asn Gly Lys Lys Tyr  Tyr Phe Asn
    2480                 2485                 2490

Thr Asn  Thr Ser Ile Ala Ser  Thr Gly Tyr Thr Ile  Ile Ser Gly
    2495                 2500                 2505

Lys His  Phe Tyr Phe Asn Thr  Asp Gly Ile Met Gln  Ile Gly Val
    2510                 2515                 2520

Phe Lys  Gly Pro Asp Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr
    2525                 2530                 2535

Asp Ala  Asn Asn Ile Glu Gly  Gln Ala Ile Arg Tyr  Gln Asn Arg
    2540                 2545                 2550

Phe Leu  Tyr Leu His Asp Asn  Ile Tyr Tyr Phe Gly  Asn Asn Ser
    2555                 2560                 2565

Lys Ala  Ala Thr Gly Trp Val  Thr Ile Asp Gly Asn  Arg Tyr Tyr
    2570                 2575                 2580

Phe Glu  Pro Asn Thr Ala Met  Gly Ala Asn Gly Tyr  Lys Thr Ile
    2585                 2590                 2595

Asp Asn  Lys Asn Phe Tyr Phe  Arg Asn Gly Leu Pro  Gln Ile Gly
    2600                 2605                 2610

Val Phe  Lys Gly Ser Asn Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2615                 2620                 2625

Thr Asp  Ala Asn Asn Ile Glu  Gly Gln Ala Ile Arg  Tyr Gln Asn
    2630                 2635                 2640
```

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Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

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<211> 2366
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 213

Gly Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg
1 5 10 15

Phe Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
20 25 30

Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
35 40 45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
50 55 60

Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65 70 75 80

```
Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys
                85                  90                  95

Asn Leu His Phe Val Ala Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
            100                 105                 110

Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
        115                 120                 125

Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
    130                 135                 140

Val Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145                 150                 155                 160

Leu Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met
                165                 170                 175

Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala
            180                 185                 190

Gln Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr
        195                 200                 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr
    210                 215                 220

Ile Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val
225                 230                 235                 240

Arg Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu
                245                 250                 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu
            260                 265                 270

Arg Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Ala
        275                 280                 285
```

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```
Met Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro
    290                 295                 300

Ser Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile
305                 310                 315                 320

Met Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp
                325                 330                 335

Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
            340                 345                 350

Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala
        355                 360                 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn
    370                 375                 380

Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val
385                 390                 395                 400

Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro
                405                 410                 415

Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile
            420                 425                 430

Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met
        435                 440                 445

Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr
    450                 455                 460

Thr Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp
465                 470                 475                 480

Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala
                485                 490                 495
```

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```
Asp Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr
            500                 505                 510

Glu Gln Gln Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys
        515                 520                 525

Ala Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly
    530                 535                 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu
545                 550                 555                 560

Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly
                565                 570                 575

Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
            580                 585                 590

Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe
        595                 600                 605

Gln Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly
    610                 615                 620

Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile
625                 630                 635                 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp
                645                 650                 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser
            660                 665                 670

Thr Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro
        675                 680                 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser
    690                 695                 700
```

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```
Ile Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys
705                 710                 715                 720

Asp Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
                725                 730                 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg
            740                 745                 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
        755                 760                 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
    770                 775                 780

Asn Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785                 790                 795                 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu
                805                 810                 815

Glu Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
            820                 825                 830

Asp Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr
        835                 840                 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser
    850                 855                 860

Ile Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp
865                 870                 875                 880

Ser His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe
                885                 890                 895

Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
            900                 905                 910
```

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```
Thr Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu
        915                 920                 925

Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
    930                 935                 940

Val Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn
945                 950                 955                 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu
                965                 970                 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
            980                 985                 990

Leu Phe Ser Thr Gly Leu Asn Thr  Ile Thr Asp Ala Ala  Lys Val Val
        995                 1000                1005

Glu Leu  Val Ser Thr Ala Leu  Asp Glu Thr Ile Asp  Leu Leu Pro
    1010                1015                1020

Thr Leu  Ser Glu Gly Leu Pro  Ile Ile Ala Thr Ile  Ile Asp Gly
    1025                1030                1035

Val Ser  Leu Gly Ala Ala Ile  Lys Glu Leu Ser Glu  Thr Ser Asp
    1040                1045                1050

Pro Leu  Leu Arg Gln Glu Ile  Glu Ala Lys Ile Gly  Ile Met Ala
    1055                1060                1065

Val Asn  Leu Thr Thr Ala Thr  Thr Ala Ile Ile Thr  Ser Ser Leu
    1070                1075                1080

Gly Ile  Ala Ser Gly Phe Ser  Ile Leu Leu Val Pro  Leu Ala Gly
    1085                1090                1095

Ile Ser  Ala Gly Ile Pro Ser  Leu Val Asn Asn Glu  Leu Val Leu
    1100                1105                1110
```

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Arg Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Val Ser
1115 1120 1125

Leu Val Glu Thr Glu Gly Val Phe Thr Leu Leu Asp Asp Lys Ile
1130 1135 1140

Met Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn
1145 1150 1155

Asn Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu
1160 1165 1170

Gly Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe
1175 1180 1185

Ser Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr
1190 1195 1200

Asp Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp
1205 1210 1215

Leu Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu
1220 1225 1230

Thr Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr
1235 1240 1245

Lys Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr
1250 1255 1260

Trp Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu
1265 1270 1275

Lys Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser
1280 1285 1290

Asn Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile
1295 1300 1305

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Arg Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr
1310 1315 1320

Ala Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu
1325 1330 1335

Ser Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg
1340 1345 1350

Asp Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile
1355 1360 1365

Glu Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile
1370 1375 1380

Leu Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser
1385 1390 1395

Asn Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn
1400 1405 1410

Ala Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu
1415 1420 1425

Ile Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile
1430 1435 1440

Gln Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys
1445 1450 1455

Asn Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly
1460 1465 1470

Phe Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu
1475 1480 1485

Pro Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys
1490 1495 1500

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Pro Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val
1505 1510 1515

Ile Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys
1520 1525 1530

Asp Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys
1535 1540 1545

Thr Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala
1550 1555 1560

Glu Ile Leu Lys Phe Met Asn Arg Lys Gly Asn Thr Asn Thr Ser
1565 1570 1575

Asp Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile
1580 1585 1590

Phe Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala
1595 1600 1605

Asn Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe
1610 1615 1620

Ile Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe
1625 1630 1635

Asn Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln
1640 1645 1650

Asn Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp
1655 1660 1665

Ile Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly
1670 1675 1680

Ile Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr
1685 1690 1695

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Thr Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr
1700 1705 1710

Tyr Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys
1715 1720 1725

Ile Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser
1730 1735 1740

Asn Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn
1745 1750 1755

Lys Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp
1760 1765 1770

Lys Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln
1775 1780 1785

Asp Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr
1790 1795 1800

Tyr Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu
1805 1810 1815

Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser
1820 1825 1830

Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro
1835 1840 1845

Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys
1850 1855 1860

Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu
1865 1870 1875

Thr Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val
1880 1885 1890

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```
Leu Gln  Thr Gly Val Phe Ser  Thr Glu Asp Gly Phe  Lys Tyr Phe
    1895                1900                1905

Ala Pro  Ala Asn Thr Leu Asp  Glu Asn Leu Glu Gly  Glu Ala Ile
    1910                1915                1920

Asp Phe  Thr Gly Lys Leu Ile  Ile Asp Glu Asn Ile  Tyr Tyr Phe
    1925                1930                1935

Asp Asp  Asn Tyr Arg Gly Ala  Val Glu Trp Lys Glu  Leu Asp Gly
    1940                1945                1950

Glu Met  His Tyr Phe Ser Pro  Glu Thr Gly Lys Ala  Phe Lys Gly
    1955                1960                1965

Leu Asn  Gln Ile Gly Asp Tyr  Lys Tyr Tyr Phe Asn  Ser Asp Gly
    1970                1975                1980

Val Met  Gln Lys Gly Phe Val  Ser Ile Asn Asp Asn  Lys His Tyr
    1985                1990                1995

Phe Asp  Asp Ser Gly Val Met  Lys Val Gly Tyr Thr  Glu Ile Asp
    2000                2005                2010

Gly Lys  His Phe Tyr Phe Ala  Glu Asn Gly Glu Met  Gln Ile Gly
    2015                2020                2025

Val Phe  Asn Thr Glu Asp Gly  Phe Lys Tyr Phe Ala  His His Asn
    2030                2035                2040

Glu Asp  Leu Gly Asn Glu Glu  Gly Glu Glu Ile Ser  Tyr Ser Gly
    2045                2050                2055

Ile Leu  Asn Phe Asn Asn Lys  Ile Tyr Tyr Phe Asp  Asp Ser Phe
    2060                2065                2070

Thr Ala  Val Val Gly Trp Lys  Asp Leu Glu Asp Gly  Ser Lys Tyr
    2075                2080                2085
```

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Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu
2090 2095 2100

Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln
2105 2110 2115

Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp
2120 2125 2130

Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
2135 2140 2145

Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp
2150 2155 2160

Thr Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn
2165 2170 2175

Asp Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg
2180 2185 2190

Val Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu
2195 2200 2205

Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile
2225 2230 2235

Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr
2240 2245 2250

Gly Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn
2255 2260 2265

Gly Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe
2270 2275 2280

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Tyr Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr
2285 2290 2295

Pro Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu
2300 2305 2310

Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu
2315 2320 2325

Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr
2330 2335 2340

Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp
2345 2350 2355

Thr Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 214
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 214

Gly Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg
1 5 10 15

Phe Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
20 25 30

Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
35 40 45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
50 55 60

Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65 70 75 80

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```
Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys
                85                  90                  95

Asn Leu His Phe Val Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp Met
        275                 280                 285
```

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```
Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495
```

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```
Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545                 550                 555                 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
            580                 585                 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
        595                 600                 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
    610                 615                 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625                 630                 635                 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
                645                 650                 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
            660                 665                 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
        675                 680                 685

Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser Ile
    690                 695                 700
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Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705                 710                 715                 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
                725                 730                 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
            740                 745                 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
        755                 760                 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
    770                 775                 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785                 790                 795                 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
                805                 810                 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
            820                 825                 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
        835                 840                 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
    850                 855                 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865                 870                 875                 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
                885                 890                 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910
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Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
        915                 920                 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Ile  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050

Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
    1055                1060                1065

Asn Leu  Thr Thr Ala Thr Thr  Ala Ile Ile Thr Ser  Ser Leu Gly
    1070                1075                1080

Ile Ala  Ser Gly Phe Ser Ile  Leu Leu Val Pro Leu  Ala Gly Ile
    1085                1090                1095

Ser Ala  Gly Ile Pro Ser Leu  Val Asn Asn Glu Leu  Val Leu Arg
    1100                1105                1110
```

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Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Val Ser Leu
1115 1120 1125

Val Glu Thr Glu Gly Val Phe Thr Leu Leu Asp Asp Lys Ile Met
1130 1135 1140

Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile Arg
1295 1300 1305

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Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile Leu
1370 1375 1380

Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

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Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys Thr
1535 1540 1545

Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Arg Lys Gly Asn Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe
1580 1585 1590

Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

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```
Asp Glu  Ile Asn Ile Thr Pro  Val Tyr Glu Thr Asn  Asn Thr Tyr
    1700                1705                1710

Pro Glu  Val Ile Val Leu Asp  Ala Asn Tyr Ile Asn  Glu Lys Ile
    1715                1720                1725

Asn Val  Asn Ile Asn Asp Leu  Ser Ile Arg Tyr Val  Trp Ser Asn
    1730                1735                1740

Asp Gly  Asn Asp Phe Ile Leu  Met Ser Thr Ser Glu  Glu Asn Lys
    1745                1750                1755

Val Ser  Gln Val Lys Ile Arg  Phe Val Asn Val Phe  Lys Asp Lys
    1760                1765                1770

Thr Leu  Ala Asn Lys Leu Ser  Phe Asn Phe Ser Asp  Lys Gln Asp
    1775                1780                1785

Val Pro  Val Ser Glu Ile Ile  Leu Ser Phe Thr Pro  Ser Tyr Tyr
    1790                1795                1800

Glu Asp  Gly Leu Ile Gly Tyr  Asp Leu Gly Leu Val  Ser Leu Tyr
    1805                1810                1815

Asn Glu  Lys Phe Tyr Ile Asn  Asn Phe Gly Met Met  Val Ser Gly
    1820                1825                1830

Leu Ile  Tyr Ile Asn Asp Ser  Leu Tyr Tyr Phe Lys  Pro Pro Val
    1835                1840                1845

Asn Asn  Leu Ile Thr Gly Phe  Val Thr Val Gly Asp  Asp Lys Tyr
    1850                1855                1860

Tyr Phe  Asn Pro Ile Asn Gly  Gly Ala Ala Ser Ile  Gly Glu Thr
    1865                1870                1875

Ile Ile  Asp Asp Lys Asn Tyr  Tyr Phe Asn Gln Ser  Gly Val Leu
    1880                1885                1890
```

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```
Gln Thr  Gly Val Phe Ser Thr  Glu Asp Gly Phe Lys  Tyr Phe Ala
    1895                1900                1905

Pro Ala  Asn Thr Leu Asp Glu  Asn Leu Glu Gly Glu  Ala Ile Asp
    1910                1915                1920

Phe Thr  Gly Lys Leu Ile Ile  Asp Glu Asn Ile Tyr  Tyr Phe Asp
    1925                1930                1935

Asp Asn  Tyr Arg Gly Ala Val  Glu Trp Lys Glu Leu  Asp Gly Glu
    1940                1945                1950

Met His  Tyr Phe Ser Pro Glu  Thr Gly Lys Ala Phe  Lys Gly Leu
    1955                1960                1965

Asn Gln  Ile Gly Asp Tyr Lys  Tyr Tyr Phe Asn Ser  Asp Gly Val
    1970                1975                1980

Met Gln  Lys Gly Phe Val Ser  Ile Asn Asp Asn Lys  His Tyr Phe
    1985                1990                1995

Asp Asp  Ser Gly Val Met Lys  Val Gly Tyr Thr Glu  Ile Asp Gly
    2000                2005                2010

Lys His  Phe Tyr Phe Ala Glu  Asn Gly Glu Met Gln  Ile Gly Val
    2015                2020                2025

Phe Asn  Thr Glu Asp Gly Phe  Lys Tyr Phe Ala His  His Asn Glu
    2030                2035                2040

Asp Leu  Gly Asn Glu Glu Gly  Glu Glu Ile Ser Tyr  Ser Gly Ile
    2045                2050                2055

Leu Asn  Phe Asn Asn Lys Ile  Tyr Tyr Phe Asp Asp  Ser Phe Thr
    2060                2065                2070

Ala Val  Val Gly Trp Lys Asp  Leu Glu Asp Gly Ser  Lys Tyr Tyr
    2075                2080                2085
```

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Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

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Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 215
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 215

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

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```
Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Ala Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270
```

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```
Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480
```

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```
Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Gln Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545                 550                 555                 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
            580                 585                 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
        595                 600                 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
    610                 615                 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625                 630                 635                 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
                645                 650                 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
            660                 665                 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
        675                 680                 685
```

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```
Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser Ile
    690                 695                 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705                 710                 715                 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
                725                 730                 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
            740                 745                 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
        755                 760                 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
    770                 775                 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785                 790                 795                 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
                805                 810                 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
            820                 825                 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
        835                 840                 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
    850                 855                 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865                 870                 875                 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
                885                 890                 895
```

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```
Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
        915                 920                 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Ile  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050

Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
    1055                1060                1065

Asn Leu  Thr Thr Ala Thr Thr  Ala Ile Ile Thr Ser  Ser Leu Gly
    1070                1075                1080

Ile Ala  Ser Gly Phe Ser Ile  Leu Leu Val Pro Leu  Ala Gly Ile
    1085                1090                1095
```

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Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg
1100 1105 1110

Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Val Ser Leu
1115 1120 1125

Val Glu Thr Glu Gly Val Phe Thr Leu Leu Asp Asp Lys Ile Met
1130 1135 1140

Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

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Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile Leu
1370 1375 1380

Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

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```
Asp Val  Val Leu Ile Ser Lys  Val Tyr Met Asp Asp  Ser Lys Pro
    1490                1495                1500

Ser Phe  Gly Tyr Tyr Ser Asn  Asn Leu Lys Asp Val  Lys Val Ile
    1505                1510                1515

Thr Lys  Asp Asn Val Asn Ile  Leu Thr Gly Tyr Tyr  Leu Lys Asp
    1520                1525                1530

Asp Ile  Lys Ile Ser Leu Ser  Leu Thr Leu Gln Asp  Glu Lys Thr
    1535                1540                1545

Ile Lys  Leu Asn Ser Val His  Leu Asp Glu Ser Gly  Val Ala Glu
    1550                1555                1560

Ile Leu  Lys Phe Met Asn Arg  Lys Gly Asn Thr Asn  Thr Ser Asp
    1565                1570                1575

Ser Leu  Met Ser Phe Leu Glu  Ser Met Asn Ile Lys  Ser Ile Phe
    1580                1585                1590

Val Asn  Phe Leu Gln Ser Asn  Ile Lys Phe Ile Leu  Asp Ala Asn
    1595                1600                1605

Phe Ile  Ile Ser Gly Thr Thr  Ser Ile Gly Gln Phe  Glu Phe Ile
    1610                1615                1620

Cys Asp  Glu Asn Asp Asn Ile  Gln Pro Tyr Phe Ile  Lys Phe Asn
    1625                1630                1635

Thr Leu  Glu Thr Asn Tyr Thr  Leu Tyr Val Gly Asn  Arg Gln Asn
    1640                1645                1650

Met Ile  Val Glu Pro Asn Tyr  Asp Leu Asp Asp Ser  Gly Asp Ile
    1655                1660                1665

Ser Ser  Thr Val Ile Asn Phe  Ser Gln Lys Tyr Leu  Tyr Gly Ile
    1670                1675                1680
```

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```
Asp Ser  Cys Val Asn Lys Val  Val Ile Ser Pro Asn  Ile Tyr Thr
    1685                1690                1695

Asp Glu  Ile Asn Ile Thr Pro  Val Tyr Glu Thr Asn  Asn Thr Tyr
    1700                1705                1710

Pro Glu  Val Ile Val Leu Asp  Ala Asn Tyr Ile Asn  Glu Lys Ile
    1715                1720                1725

Asn Val  Asn Ile Asn Asp Leu  Ser Ile Arg Tyr Val  Trp Ser Asn
    1730                1735                1740

Asp Gly  Asn Asp Phe Ile Leu  Met Ser Thr Ser Glu  Glu Asn Lys
    1745                1750                1755

Val Ser  Gln Val Lys Ile Arg  Phe Val Asn Val Phe  Lys Asp Lys
    1760                1765                1770

Thr Leu  Ala Asn Lys Leu Ser  Phe Asn Phe Ser Asp  Lys Gln Asp
    1775                1780                1785

Val Pro  Val Ser Glu Ile Ile  Leu Ser Phe Thr Pro  Ser Tyr Tyr
    1790                1795                1800

Glu Asp  Gly Leu Ile Gly Tyr  Asp Leu Gly Leu Val  Ser Leu Tyr
    1805                1810                1815

Asn Glu  Lys Phe Tyr Ile Asn  Asn Phe Gly Met Met  Val Ser Gly
    1820                1825                1830

Leu Ile  Tyr Ile Asn Asp Ser  Leu Tyr Tyr Phe Lys  Pro Pro Val
    1835                1840                1845

Asn Asn  Leu Ile Thr Gly Phe  Val Thr Val Gly Asp  Asp Lys Tyr
    1850                1855                1860

Tyr Phe  Asn Pro Ile Asn Gly  Gly Ala Ala Ser Ile  Gly Glu Thr
    1865                1870                1875
```

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```
Ile Ile  Asp Asp Lys Asn Tyr  Tyr Phe Asn Gln Ser  Gly Val Leu
    1880                1885                1890

Gln Thr  Gly Val Phe Ser Thr  Glu Asp Gly Phe Lys  Tyr Phe Ala
    1895                1900                1905

Pro Ala  Asn Thr Leu Asp Glu  Asn Leu Glu Gly Glu  Ala Ile Asp
    1910                1915                1920

Phe Thr  Gly Lys Leu Ile Ile  Asp Glu Asn Ile Tyr  Tyr Phe Asp
    1925                1930                1935

Asp Asn  Tyr Arg Gly Ala Val  Glu Trp Lys Glu Leu  Asp Gly Glu
    1940                1945                1950

Met His  Tyr Phe Ser Pro Glu  Thr Gly Lys Ala Phe  Lys Gly Leu
    1955                1960                1965

Asn Gln  Ile Gly Asp Tyr Lys  Tyr Tyr Phe Asn Ser  Asp Gly Val
    1970                1975                1980

Met Gln  Lys Gly Phe Val Ser  Ile Asn Asp Asn Lys  His Tyr Phe
    1985                1990                1995

Asp Asp  Ser Gly Val Met Lys  Val Gly Tyr Thr Glu  Ile Asp Gly
    2000                2005                2010

Lys His  Phe Tyr Phe Ala Glu  Asn Gly Glu Met Gln  Ile Gly Val
    2015                2020                2025

Phe Asn  Thr Glu Asp Gly Phe  Lys Tyr Phe Ala His  His Asn Glu
    2030                2035                2040

Asp Leu  Gly Asn Glu Glu Gly  Glu Glu Ile Ser Tyr  Ser Gly Ile
    2045                2050                2055

Leu Asn  Phe Asn Asn Lys Ile  Tyr Tyr Phe Asp Asp  Ser Phe Thr
    2060                2065                2070
```

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```
Ala Val  Val Gly Trp Lys Asp  Leu Glu Asp Gly Ser  Lys Tyr Tyr
    2075                2080                2085

Phe Asp  Glu Asp Thr Ala Glu  Ala Tyr Ile Gly Leu  Ser Leu Ile
    2090                2095                2100

Asn Asp  Gly Gln Tyr Tyr Phe  Asn Asp Asp Gly Ile  Met Gln Val
    2105                2110                2115

Gly Phe  Val Thr Ile Asn Asp  Lys Val Phe Tyr Phe  Ser Asp Ser
    2120                2125                2130

Gly Ile  Ile Glu Ser Gly Val  Gln Asn Ile Asp Asp  Asn Tyr Phe
    2135                2140                2145

Tyr Ile  Asp Asp Asn Gly Ile  Val Gln Ile Gly Val  Phe Asp Thr
    2150                2155                2160

Ser Asp  Gly Tyr Lys Tyr Phe  Ala Pro Ala Asn Thr  Val Asn Asp
    2165                2170                2175

Asn Ile  Tyr Gly Gln Ala Val  Glu Tyr Ser Gly Leu  Val Arg Val
    2180                2185                2190

Gly Glu  Asp Val Tyr Tyr Phe  Gly Glu Thr Tyr Thr  Ile Glu Thr
    2195                2200                2205

Gly Trp  Ile Tyr Asp Met Glu  Asn Glu Ser Asp Lys  Tyr Tyr Phe
    2210                2215                2220

Asn Pro  Glu Thr Lys Lys Ala  Cys Lys Gly Ile Asn  Leu Ile Asp
    2225                2230                2235

Asp Ile  Lys Tyr Tyr Phe Asp  Glu Lys Gly Ile Met  Arg Thr Gly
    2240                2245                2250

Leu Ile  Ser Phe Glu Asn Asn  Asn Tyr Tyr Phe Asn  Glu Asn Gly
    2255                2260                2265
```

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Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 216
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 216

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

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```
Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Ala Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270
```

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```
Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480
```

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```
Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Gln Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545                 550                 555                 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
            580                 585                 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
        595                 600                 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
    610                 615                 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625                 630                 635                 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
                645                 650                 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
            660                 665                 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
        675                 680                 685
```

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```
Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser Ile
    690                 695                 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705                 710                 715                 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
                725                 730                 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
            740                 745                 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
        755                 760                 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
    770                 775                 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785                 790                 795                 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
                805                 810                 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
            820                 825                 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
        835                 840                 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
    850                 855                 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865                 870                 875                 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
                885                 890                 895
```

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```
Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
        915                 920                 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Ile  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050

Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
    1055                1060                1065

Asn Leu  Thr Thr Ala Thr Thr  Ala Ile Ile Thr Ser  Ser Leu Gly
    1070                1075                1080

Ile Ala  Ser Gly Phe Ser Ile  Leu Leu Val Pro Leu  Ala Gly Ile
    1085                1090                1095
```

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Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg
1100 1105 1110

Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Val Ser Leu
1115 1120 1125

Val Glu Thr Glu Gly Val Phe Thr Leu Leu Asp Asp Lys Ile Met
1130 1135 1140

Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

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Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile Leu
1370 1375 1380

Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

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```
Asp Val  Val Leu Ile Ser Lys  Val Tyr Met Asp Asp  Ser Lys Pro
    1490                 1495                 1500

Ser Phe  Gly Tyr Tyr Ser Asn  Asn Leu Lys Asp Val  Lys Val Ile
    1505                 1510                 1515

Thr Lys  Asp Asn Val Asn Ile  Leu Thr Gly Tyr Tyr  Leu Lys Asp
    1520                 1525                 1530

Asp Ile  Lys Ile Ser Leu Ser  Leu Thr Leu Gln Asp  Glu Lys Thr
    1535                 1540                 1545

Ile Lys  Leu Asn Ser Val His  Leu Asp Glu Ser Gly  Val Ala Glu
    1550                 1555                 1560

Ile Leu  Lys Phe Met Asn Arg  Lys Gly Asn Thr Asn  Thr Ser Asp
    1565                 1570                 1575

Ser Leu  Met Ser Phe Leu Glu  Ser Met Asn Ile Lys  Ser Ile Phe
    1580                 1585                 1590

Val Asn  Phe Leu Gln Ser Asn  Ile Lys Phe Ile Leu  Asp Ala Asn
    1595                 1600                 1605

Phe Ile  Ile Ser Gly Thr Thr  Ser Ile Gly Gln Phe  Glu Phe Ile
    1610                 1615                 1620

Cys Asp  Glu Asn Asp Asn Ile  Gln Pro Tyr Phe Ile  Lys Phe Asn
    1625                 1630                 1635

Thr Leu  Glu Thr Asn Tyr Thr  Leu Tyr Val Gly Asn  Arg Gln Asn
    1640                 1645                 1650

Met Ile  Val Glu Pro Asn Tyr  Asp Leu Asp Asp Ser  Gly Asp Ile
    1655                 1660                 1665

Ser Ser  Thr Val Ile Asn Phe  Ser Gln Lys Tyr Leu  Tyr Gly Ile
    1670                 1675                 1680
```

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Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

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```
Ile Ile  Asp Asp Lys Asn Tyr  Tyr Phe Asn Gln Ser  Gly Val Leu
    1880                1885                1890

Gln Thr  Gly Val Phe Ser Thr  Glu Asp Gly Phe Lys  Tyr Phe Ala
    1895                1900                1905

Pro Ala  Asn Thr Leu Asp Glu  Asn Leu Glu Gly Glu  Ala Ile Asp
    1910                1915                1920

Phe Thr  Gly Lys Leu Ile Ile  Asp Glu Asn Ile Tyr  Tyr Phe Asp
    1925                1930                1935

Asp Asn  Tyr Arg Gly Ala Val  Glu Trp Lys Glu Leu  Asp Gly Glu
    1940                1945                1950

Met His  Tyr Phe Ser Pro Glu  Thr Gly Lys Ala Phe  Lys Gly Leu
    1955                1960                1965

Asn Gln  Ile Gly Asp Tyr Lys  Tyr Tyr Phe Asn Ser  Asp Gly Val
    1970                1975                1980

Met Gln  Lys Gly Phe Val Ser  Ile Asn Asp Asn Lys  His Tyr Phe
    1985                1990                1995

Asp Asp  Ser Gly Val Met Lys  Val Gly Tyr Thr Glu  Ile Asp Gly
    2000                2005                2010

Lys His  Phe Tyr Phe Ala Glu  Asn Gly Glu Met Gln  Ile Gly Val
    2015                2020                2025

Phe Asn  Thr Glu Asp Gly Phe  Lys Tyr Phe Ala His  His Asn Glu
    2030                2035                2040

Asp Leu  Gly Asn Glu Glu Gly  Glu Glu Ile Ser Tyr  Ser Gly Ile
    2045                2050                2055

Leu Asn  Phe Asn Asn Lys Ile  Tyr Tyr Phe Asp Asp  Ser Phe Thr
    2060                2065                2070
```

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Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

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Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 217
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 217

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

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```
Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Ala Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255
```

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```
Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460
```

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```
Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Gln Met Ala Ala Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545                 550                 555                 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
            580                 585                 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
        595                 600                 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
    610                 615                 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625                 630                 635                 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
                645                 650                 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
            660                 665                 670
```

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```
Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
        675                 680                 685

Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser Ile
    690                 695                 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705                 710                 715                 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
                725                 730                 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
            740                 745                 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
        755                 760                 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
    770                 775                 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785                 790                 795                 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
                805                 810                 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
            820                 825                 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
        835                 840                 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
    850                 855                 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865                 870                 875                 880
```

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```
His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
                885                 890                 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
        915                 920                 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Ile  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050

Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
    1055                1060                1065

Asn Leu  Thr Thr Ala Thr Thr  Ala Ile Ile Thr Ser  Ser Leu Gly
    1070                1075                1080
```

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```
Ile Ala  Ser Gly Phe Ser Ile  Leu Leu Val Pro Leu  Ala Gly Ile
    1085                1090                1095

Ser Ala  Gly Ile Pro Ser Leu  Val Asn Asn Glu Leu  Val Leu Arg
    1100                1105                1110

Asp Lys  Ala Thr Lys Val Val  Asp Tyr Phe Lys His  Val Ser Leu
    1115                1120                1125

Val Glu  Thr Glu Gly Val Phe  Thr Leu Leu Asp Asp  Lys Ile Met
    1130                1135                1140

Met Pro  Gln Asp Asp Leu Val  Ile Ser Glu Ile Asp  Phe Asn Asn
    1145                1150                1155

Asn Ser  Ile Val Leu Gly Lys  Cys Glu Ile Trp Arg  Met Glu Gly
    1160                1165                1170

Gly Ser  Gly His Thr Val Thr  Asp Asp Ile Asp His  Phe Phe Ser
    1175                1180                1185

Ala Pro  Ser Ile Thr Tyr Arg  Glu Pro His Leu Ser  Ile Tyr Asp
    1190                1195                1200

Val Leu  Glu Val Gln Lys Glu  Glu Leu Asp Leu Ser  Lys Asp Leu
    1205                1210                1215

Met Val  Leu Pro Asn Ala Pro  Asn Arg Val Phe Ala  Trp Glu Thr
    1220                1225                1230

Gly Trp  Thr Pro Gly Leu Arg  Ser Leu Glu Asn Asp  Gly Thr Lys
    1235                1240                1245

Leu Leu  Asp Arg Ile Arg Asp  Asn Tyr Glu Gly Glu  Phe Tyr Trp
    1250                1255                1260

Arg Tyr  Phe Ala Phe Ile Ala  Asp Ala Leu Ile Thr  Thr Leu Lys
    1265                1270                1275
```

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```
Pro Arg  Tyr Glu Asp Thr Asn  Ile Arg Ile Asn Leu  Asp Ser Asn
    1280                1285                1290

Thr Arg  Ser Phe Ile Val Pro  Ile Ile Thr Thr Glu  Tyr Ile Arg
    1295                1300                1305

Glu Lys  Leu Ser Tyr Ser Phe  Tyr Gly Ser Gly Gly  Thr Tyr Ala
    1310                1315                1320

Leu Ser  Leu Ser Gln Tyr Asn  Met Gly Ile Asn Ile  Glu Leu Ser
    1325                1330                1335

Glu Ser  Asp Val Trp Ile Ile  Asp Val Asp Asn Val  Val Arg Asp
    1340                1345                1350

Val Thr  Ile Glu Ser Asp Lys  Ile Lys Lys Gly Asp  Leu Ile Glu
    1355                1360                1365

Gly Ile  Leu Ser Thr Leu Ser  Ile Glu Glu Asn Lys  Ile Ile Leu
    1370                1375                1380

Asn Ser  His Glu Ile Asn Phe  Ser Gly Glu Val Asn  Gly Ser Asn
    1385                1390                1395

Gly Phe  Val Ser Leu Thr Phe  Ser Ile Leu Glu Gly  Ile Asn Ala
    1400                1405                1410

Ile Ile  Glu Val Asp Leu Leu  Ser Lys Ser Tyr Lys  Leu Leu Ile
    1415                1420                1425

Ser Gly  Glu Leu Lys Ile Leu  Met Leu Asn Ser Asn  His Ile Gln
    1430                1435                1440

Gln Lys  Ile Asp Tyr Ile Gly  Phe Asn Ser Glu Leu  Gln Lys Asn
    1445                1450                1455

Ile Pro  Tyr Ser Phe Val Asp  Ser Glu Gly Lys Glu  Asn Gly Phe
    1460                1465                1470
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Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys Thr
1535 1540 1545

Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Arg Lys Gly Asn Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe
1580 1585 1590

Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

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```
Ser Ser  Thr Val Ile Asn Phe  Ser Gln Lys Tyr Leu  Tyr Gly Ile
    1670                1675                1680

Asp Ser  Cys Val Asn Lys Val  Val Ile Ser Pro Asn  Ile Tyr Thr
    1685                1690                1695

Asp Glu  Ile Asn Ile Thr Pro  Val Tyr Glu Thr Asn  Asn Thr Tyr
    1700                1705                1710

Pro Glu  Val Ile Val Leu Asp  Ala Asn Tyr Ile Asn  Glu Lys Ile
    1715                1720                1725

Asn Val  Asn Ile Asn Asp Leu  Ser Ile Arg Tyr Val  Trp Ser Asn
    1730                1735                1740

Asp Gly  Asn Asp Phe Ile Leu  Met Ser Thr Ser Glu  Glu Asn Lys
    1745                1750                1755

Val Ser  Gln Val Lys Ile Arg  Phe Val Asn Val Phe  Lys Asp Lys
    1760                1765                1770

Thr Leu  Ala Asn Lys Leu Ser  Phe Asn Phe Ser Asp  Lys Gln Asp
    1775                1780                1785

Val Pro  Val Ser Glu Ile Ile  Leu Ser Phe Thr Pro  Ser Tyr Tyr
    1790                1795                1800

Glu Asp  Gly Leu Ile Gly Tyr  Asp Leu Gly Leu Val  Ser Leu Tyr
    1805                1810                1815

Asn Glu  Lys Phe Tyr Ile Asn  Asn Phe Gly Met Met  Val Ser Gly
    1820                1825                1830

Leu Ile  Tyr Ile Asn Asp Ser  Leu Tyr Tyr Phe Lys  Pro Pro Val
    1835                1840                1845

Asn Asn  Leu Ile Thr Gly Phe  Val Thr Val Gly Asp  Asp Lys Tyr
    1850                1855                1860
```

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```
Tyr Phe  Asn Pro Ile Asn Gly  Gly Ala Ala Ser Ile  Gly Glu Thr
    1865                1870                1875

Ile Ile  Asp Asp Lys Asn Tyr  Tyr Phe Asn Gln Ser  Gly Val Leu
    1880                1885                1890

Gln Thr  Gly Val Phe Ser Thr  Glu Asp Gly Phe Lys  Tyr Phe Ala
    1895                1900                1905

Pro Ala  Asn Thr Leu Asp Glu  Asn Leu Glu Gly Glu  Ala Ile Asp
    1910                1915                1920

Phe Thr  Gly Lys Leu Ile Ile  Asp Glu Asn Ile Tyr  Tyr Phe Asp
    1925                1930                1935

Asp Asn  Tyr Arg Gly Ala Val  Glu Trp Lys Glu Leu  Asp Gly Glu
    1940                1945                1950

Met His  Tyr Phe Ser Pro Glu  Thr Gly Lys Ala Phe  Lys Gly Leu
    1955                1960                1965

Asn Gln  Ile Gly Asp Tyr Lys  Tyr Tyr Phe Asn Ser  Asp Gly Val
    1970                1975                1980

Met Gln  Lys Gly Phe Val Ser  Ile Asn Asp Asn Lys  His Tyr Phe
    1985                1990                1995

Asp Asp  Ser Gly Val Met Lys  Val Gly Tyr Thr Glu  Ile Asp Gly
    2000                2005                2010

Lys His  Phe Tyr Phe Ala Glu  Asn Gly Glu Met Gln  Ile Gly Val
    2015                2020                2025

Phe Asn  Thr Glu Asp Gly Phe  Lys Tyr Phe Ala His  His Asn Glu
    2030                2035                2040

Asp Leu  Gly Asn Glu Glu Gly  Glu Glu Ile Ser Tyr  Ser Gly Ile
    2045                2050                2055
```

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```
Leu Asn  Phe Asn Asn Lys Ile  Tyr Tyr Phe Asp Asp  Ser Phe Thr
    2060                2065                2070

Ala Val  Val Gly Trp Lys Asp  Leu Glu Asp Gly Ser  Lys Tyr Tyr
    2075                2080                2085

Phe Asp  Glu Asp Thr Ala Glu  Ala Tyr Ile Gly Leu  Ser Leu Ile
    2090                2095                2100

Asn Asp  Gly Gln Tyr Tyr Phe  Asn Asp Asp Gly Ile  Met Gln Val
    2105                2110                2115

Gly Phe  Val Thr Ile Asn Asp  Lys Val Phe Tyr Phe  Ser Asp Ser
    2120                2125                2130

Gly Ile  Ile Glu Ser Gly Val  Gln Asn Ile Asp Asp  Asn Tyr Phe
    2135                2140                2145

Tyr Ile  Asp Asp Asn Gly Ile  Val Gln Ile Gly Val  Phe Asp Thr
    2150                2155                2160

Ser Asp  Gly Tyr Lys Tyr Phe  Ala Pro Ala Asn Thr  Val Asn Asp
    2165                2170                2175

Asn Ile  Tyr Gly Gln Ala Val  Glu Tyr Ser Gly Leu  Val Arg Val
    2180                2185                2190

Gly Glu  Asp Val Tyr Tyr Phe  Gly Glu Thr Tyr Thr  Ile Glu Thr
    2195                2200                2205

Gly Trp  Ile Tyr Asp Met Glu  Asn Glu Ser Asp Lys  Tyr Tyr Phe
    2210                2215                2220

Asn Pro  Glu Thr Lys Lys Ala  Cys Lys Gly Ile Asn  Leu Ile Asp
    2225                2230                2235

Asp Ile  Lys Tyr Tyr Phe Asp  Glu Lys Gly Ile Met  Arg Thr Gly
    2240                2245                2250
```

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Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 218
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 218

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

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```
Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Ala Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255
```

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```
Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460
```

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```
Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Gln Met Ala Ser Leu Ala Ser Phe Asp Asp Ala Arg Ala Lys Ala
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545                 550                 555                 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
            580                 585                 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
        595                 600                 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
    610                 615                 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625                 630                 635                 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
                645                 650                 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
            660                 665                 670
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Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
675 680 685

Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser Ile
690 695 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705 710 715 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
725 730 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
740 745 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
755 760 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
770 775 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785 790 795 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
805 810 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
820 825 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
835 840 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
850 855 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865 870 875 880

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```
His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
                885                 890                 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
        915                 920                 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Ile  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050

Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
    1055                1060                1065

Asn Leu  Thr Thr Ala Thr Thr  Ala Ile Ile Thr Ser  Ser Leu Gly
    1070                1075                1080
```

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Ile Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile
1085 1090 1095

Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg
1100 1105 1110

Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Val Ser Leu
1115 1120 1125

Val Glu Thr Glu Gly Val Phe Thr Leu Leu Asp Asp Lys Ile Met
1130 1135 1140

Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

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```
Pro Arg  Tyr Glu Asp Thr Asn  Ile Arg Ile Asn Leu  Asp Ser Asn
    1280                1285                1290

Thr Arg  Ser Phe Ile Val Pro  Ile Ile Thr Thr Glu  Tyr Ile Arg
    1295                1300                1305

Glu Lys  Leu Ser Tyr Ser Phe  Tyr Gly Ser Gly Gly  Thr Tyr Ala
    1310                1315                1320

Leu Ser  Leu Ser Gln Tyr Asn  Met Gly Ile Asn Ile  Glu Leu Ser
    1325                1330                1335

Glu Ser  Asp Val Trp Ile Ile  Asp Val Asp Asn Val  Val Arg Asp
    1340                1345                1350

Val Thr  Ile Glu Ser Asp Lys  Ile Lys Lys Gly Asp  Leu Ile Glu
    1355                1360                1365

Gly Ile  Leu Ser Thr Leu Ser  Ile Glu Glu Asn Lys  Ile Ile Leu
    1370                1375                1380

Asn Ser  His Glu Ile Asn Phe  Ser Gly Glu Val Asn  Gly Ser Asn
    1385                1390                1395

Gly Phe  Val Ser Leu Thr Phe  Ser Ile Leu Glu Gly  Ile Asn Ala
    1400                1405                1410

Ile Ile  Glu Val Asp Leu Leu  Ser Lys Ser Tyr Lys  Leu Leu Ile
    1415                1420                1425

Ser Gly  Glu Leu Lys Ile Leu  Met Leu Asn Ser Asn  His Ile Gln
    1430                1435                1440

Gln Lys  Ile Asp Tyr Ile Gly  Phe Asn Ser Glu Leu  Gln Lys Asn
    1445                1450                1455

Ile Pro  Tyr Ser Phe Val Asp  Ser Glu Gly Lys Glu  Asn Gly Phe
    1460                1465                1470
```

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```
Ile Asn  Gly Ser Thr Lys Glu  Gly Leu Phe Val Ser  Glu Leu Pro
    1475                 1480                 1485

Asp Val  Val Leu Ile Ser Lys  Val Tyr Met Asp Asp  Ser Lys Pro
    1490                 1495                 1500

Ser Phe  Gly Tyr Tyr Ser Asn  Asn Leu Lys Asp Val  Lys Val Ile
    1505                 1510                 1515

Thr Lys  Asp Asn Val Asn Ile  Leu Thr Gly Tyr Tyr  Leu Lys Asp
    1520                 1525                 1530

Asp Ile  Lys Ile Ser Leu Ser  Leu Thr Leu Gln Asp  Glu Lys Thr
    1535                 1540                 1545

Ile Lys  Leu Asn Ser Val His  Leu Asp Glu Ser Gly  Val Ala Glu
    1550                 1555                 1560

Ile Leu  Lys Phe Met Asn Arg  Lys Gly Asn Thr Asn  Thr Ser Asp
    1565                 1570                 1575

Ser Leu  Met Ser Phe Leu Glu  Ser Met Asn Ile Lys  Ser Ile Phe
    1580                 1585                 1590

Val Asn  Phe Leu Gln Ser Asn  Ile Lys Phe Ile Leu  Asp Ala Asn
    1595                 1600                 1605

Phe Ile  Ile Ser Gly Thr Thr  Ser Ile Gly Gln Phe  Glu Phe Ile
    1610                 1615                 1620

Cys Asp  Glu Asn Asp Asn Ile  Gln Pro Tyr Phe Ile  Lys Phe Asn
    1625                 1630                 1635

Thr Leu  Glu Thr Asn Tyr Thr  Leu Tyr Val Gly Asn  Arg Gln Asn
    1640                 1645                 1650

Met Ile  Val Glu Pro Asn Tyr  Asp Leu Asp Asp Ser  Gly Asp Ile
    1655                 1660                 1665
```

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Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

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Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Tyr Lys Tyr Tyr Phe Asn Ser Asp Gly Val
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile
2045 2050 2055

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Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly
2240 2245 2250

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Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

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<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

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Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Val Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

```
Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Ala Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Val Glu Ser Ala Thr Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Tyr Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Thr Gln
            180                 185                 190

Arg Glu Glu Asn Pro Asp Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Asp Ile Asp Glu Leu Asn Ser Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Val Thr Glu Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240
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```
Asn Phe Glu Glu Phe Lys Gly Gly Glu Ser Phe Lys Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Val Gly Gly Val Tyr Leu Asp Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Val Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Ala Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445
```

```
Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Gln Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Lys Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Thr Val Val Asp Lys Glu Tyr
545                 550                 555                 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
            580                 585                 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
        595                 600                 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
    610                 615                 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625                 630                 635                 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
                645                 650                 655
```

```
Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser Thr
            660                 665                 670

Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
        675                 680                 685

Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser Val
    690                 695                 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Arg Val Lys Asp
705                 710                 715                 720

Lys Val Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
                725                 730                 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
            740                 745                 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
        755                 760                 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
    770                 775                 780

Lys Ile Ile Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785                 790                 795                 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
                805                 810                 815

Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
            820                 825                 830

Thr Gln Val Val Glu Gly Arg Ile Glu Glu Ala Lys Ser Leu Thr Ser
        835                 840                 845

Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser Ile
    850                 855                 860
```

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```
Ser Asp Ala Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Glu Glu Ser
865                 870                 875                 880

His Phe Ile Ser Phe Glu Asp Ile Leu Glu Thr Asp Glu Gly Phe Ser
                885                 890                 895

Ile Arg Phe Ile Asp Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Ala Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
        915                 920                 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Ala Thr His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Val  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050

Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
    1055                1060                1065
```

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```
Asn Leu  Thr Ala Ala Thr Thr  Ala Ile Ile Thr Ser  Ser Leu Gly
    1070                1075                1080

Ile Ala  Ser Gly Phe Ser Ile  Leu Leu Val Pro Leu  Ala Gly Ile
    1085                1090                1095

Ser Ala  Gly Ile Pro Ser Leu  Val Asn Asn Glu Leu  Ile Leu Arg
    1100                1105                1110

Asp Lys  Ala Thr Lys Val Val  Asp Tyr Phe Ser His  Ile Ser Leu
    1115                1120                1125

Ala Glu  Ser Glu Gly Ala Phe  Thr Ser Leu Asp Asp  Lys Ile Met
    1130                1135                1140

Met Pro  Gln Asp Asp Leu Val  Ile Ser Glu Ile Asp  Phe Asn Asn
    1145                1150                1155

Asn Ser  Ile Thr Leu Gly Lys  Cys Glu Ile Trp Arg  Met Glu Gly
    1160                1165                1170

Gly Ser  Gly His Thr Val Thr  Asp Asp Ile Asp His  Phe Phe Ser
    1175                1180                1185

Ala Pro  Ser Ile Thr Tyr Arg  Glu Pro His Leu Ser  Ile Tyr Asp
    1190                1195                1200

Val Leu  Glu Val Gln Lys Glu  Glu Leu Asp Leu Ser  Lys Asp Leu
    1205                1210                1215

Met Val  Leu Pro Asn Ala Pro  Asn Arg Val Phe Ala  Trp Glu Thr
    1220                1225                1230

Gly Trp  Thr Pro Gly Leu Arg  Ser Leu Glu Asn Asp  Gly Thr Lys
    1235                1240                1245

Leu Leu  Asp Arg Ile Arg Asp  Asn Tyr Glu Gly Glu  Phe Tyr Trp
    1250                1255                1260
```

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Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Thr Arg Ser Phe Ile Val Pro Val Ile Thr Thr Glu Tyr Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Asn Ile Asn Ile Glu Leu Asn
1325 1330 1335

Glu Asn Asp Thr Trp Val Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Asn Ile Leu Ser Lys Leu Ser Ile Glu Asp Asn Lys Ile Ile Leu
1370 1375 1380

Asp Asn His Glu Ile Asn Phe Ser Gly Thr Leu Asn Gly Gly Asn
1385 1390 1395

Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Val Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Val Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Thr Leu Met Ala Asn Ser Asn Ser Val Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Leu Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

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Ile Pro Tyr Ser Phe Met Asp Asp Lys Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Cys Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Ser
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asn Ser Lys Pro
1490 1495 1500

Leu Phe Gly Tyr Cys Ser Asn Asp Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asp Val Ile Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Phe Thr Ile Gln Asp Glu Asn Thr
1535 1540 1545

Ile Lys Leu Asn Gly Val Tyr Leu Asp Glu Asn Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Lys Lys Gly Ser Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe
1580 1585 1590

Ile Asn Ser Leu Gln Ser Asn Thr Lys Leu Ile Leu Asp Thr Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Lys Asp Asn Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Lys Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

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Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Ile Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Ile Tyr Glu Ala Asn Asn Thr Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Thr Asn Tyr Ile Ser Glu Lys Ile
1715 1720 1725

Asn Ile Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Ser Asp Phe Ile Leu Met Ser Thr Asp Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Thr Asn Val Phe Lys Gly Asn
1760 1765 1770

Thr Ile Ser Asp Lys Ile Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Ser Ile Asn Lys Val Ile Ser Thr Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Val Glu Gly Leu Leu Asn Tyr Asp Leu Gly Leu Ile Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Val Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Ile
1835 1840 1845

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```
Lys Asn  Leu Ile Thr Gly Phe  Thr Thr Ile Gly Asp  Asp Lys Tyr
    1850                1855                1860

Tyr Phe  Asn Pro Asp Asn Gly  Gly Ala Ala Ser Val  Gly Glu Thr
    1865                1870                1875

Ile Ile  Asp Gly Lys Asn Tyr  Tyr Phe Ser Gln Asn  Gly Val Leu
    1880                1885                1890

Gln Thr  Gly Val Phe Ser Thr  Glu Asp Gly Phe Lys  Tyr Phe Ala
    1895                1900                1905

Pro Ala  Asp Thr Leu Asp Glu  Asn Leu Glu Gly Glu  Ala Ile Asp
    1910                1915                1920

Phe Thr  Gly Lys Leu Thr Ile  Asp Glu Asn Val Tyr  Tyr Phe Gly
    1925                1930                1935

Asp Asn  Tyr Arg Ala Ala Ile  Glu Trp Gln Thr Leu  Asp Asp Glu
    1940                1945                1950

Val Tyr  Tyr Phe Ser Thr Asp  Thr Gly Arg Ala Phe  Lys Gly Leu
    1955                1960                1965

Asn Gln  Ile Gly Asp Asp Lys  Phe Tyr Phe Asn Ser  Asp Gly Ile
    1970                1975                1980

Met Gln  Lys Gly Phe Val Asn  Ile Asn Asp Lys Thr  Phe Tyr Phe
    1985                1990                1995

Asp Asp  Ser Gly Val Met Lys  Ser Gly Tyr Thr Glu  Ile Asp Gly
    2000                2005                2010

Lys Tyr  Phe Tyr Phe Ala Glu  Asn Gly Glu Met Gln  Ile Gly Val
    2015                2020                2025

Phe Asn  Thr Ala Asp Gly Phe  Lys Tyr Phe Ala His  His Asp Glu
    2030                2035                2040
```

```
Asp Leu  Gly Asn Glu Glu Gly  Glu Ala Leu Ser Tyr  Ser Gly Ile
    2045                2050                2055

Leu Asn  Phe Asn Asn Lys Ile  Tyr Tyr Phe Asp Asp  Ser Phe Thr
    2060                2065                2070

Ala Val  Val Gly Trp Lys Asp  Leu Glu Asp Gly Ser  Lys Tyr Tyr
    2075                2080                2085

Phe Asp  Glu Asp Thr Ala Glu  Ala Tyr Ile Gly Ile  Ser Ile Ile
    2090                2095                2100

Asn Asp  Gly Lys Tyr Tyr Phe  Asn Asp Ser Gly Ile  Met Gln Ile
    2105                2110                2115

Gly Phe  Val Thr Ile Asn Asn  Glu Val Phe Tyr Phe  Ser Asp Ser
    2120                2125                2130

Gly Ile  Val Glu Ser Gly Met  Gln Asn Ile Asp Asp  Asn Tyr Phe
    2135                2140                2145

Tyr Ile  Asp Glu Asn Gly Leu  Val Gln Ile Gly Val  Phe Asp Thr
    2150                2155                2160

Ser Asp  Gly Tyr Lys Tyr Phe  Ala Pro Ala Asn Thr  Val Asn Asp
    2165                2170                2175

Asn Ile  Tyr Gly Gln Ala Val  Glu Tyr Ser Gly Leu  Val Arg Val
    2180                2185                2190

Gly Glu  Asp Val Tyr Tyr Phe  Gly Glu Thr Tyr Thr  Ile Glu Thr
    2195                2200                2205

Gly Trp  Ile Tyr Asp Met Glu  Asn Glu Ser Asp Lys  Tyr Tyr Phe
    2210                2215                2220

Asp Pro  Glu Thr Lys Lys Ala  Tyr Lys Gly Ile Asn  Val Ile Asp
    2225                2230                2235
```

```
Asp Ile  Lys Tyr Tyr Phe Asp  Glu Asn Gly Ile Met  Arg Thr Gly
    2240                2245                2250

Leu Ile  Thr Phe Glu Asp Asn  His Tyr Tyr Phe Asn  Glu Asp Gly
    2255                2260                2265

Ile Met  Gln Tyr Gly Tyr Leu  Asn Ile Glu Asp Lys  Thr Phe Tyr
    2270                2275                2280

Phe Ser  Glu Asp Gly Ile Met  Gln Ile Gly Val Phe  Asn Thr Pro
    2285                2290                2295

Asp Gly  Phe Lys Tyr Phe Ala  His Gln Asn Thr Leu  Asp Glu Asn
    2300                2305                2310

Phe Glu  Gly Glu Ser Ile Asn  Tyr Thr Gly Trp Leu  Asp Leu Asp
    2315                2320                2325

Glu Lys  Arg Tyr Tyr Phe Thr  Asp Glu Tyr Ile Ala  Ala Thr Gly
    2330                2335                2340

Ser Val  Ile Ile Asp Gly Glu  Glu Tyr Tyr Phe Asp  Pro Asp Thr
    2345                2350                2355

Ala Gln  Leu Val Ile Ser Glu
    2360                2365


<210>  220
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<212>  PRT
<213>  Artificial Sequence

<220>
<223>  Synthetic amino acid sequence

<400>  220

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1               5                  10                  15

Arg Val Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
            20                  25                  30
```

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```
Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Ala Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Val Glu Ser Ala Thr Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Tyr Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Thr Gln
            180                 185                 190

Arg Glu Glu Asn Pro Asp Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Asp Ile Asp Glu Leu Asn Ser Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Val Thr Glu Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240
```

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```
Asn Phe Glu Glu Phe Lys Gly Gly Glu Ser Phe Lys Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Val Gly Gly Val Tyr Leu Asp Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Val Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Ala Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445
```

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Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Gln Met Ala Ser Leu Ala Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Lys Asn Tyr Phe Glu Gly Ser Leu Gly Glu
530 535 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Thr Val Val Asp Lys Glu Tyr
545 550 555 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
565 570 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
580 585 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
595 600 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
610 615 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625 630 635 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
645 650 655

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```
Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser Thr
            660                 665                 670

Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
        675                 680                 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Val
    690                 695                 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Arg Val Lys Asp
705                 710                 715                 720

Lys Val Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
                725                 730                 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
            740                 745                 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
        755                 760                 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
    770                 775                 780

Lys Ile Ile Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785                 790                 795                 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
                805                 810                 815

Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
            820                 825                 830

Thr Gln Val Val Glu Gly Arg Ile Glu Glu Ala Lys Ser Leu Thr Ser
        835                 840                 845

Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser Ile
    850                 855                 860
```

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```
Ser Asp Ala Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Glu Glu Ser
865                 870                 875                 880

His Phe Ile Ser Phe Glu Asp Ile Leu Glu Thr Asp Glu Gly Phe Ser
                885                 890                 895

Ile Arg Phe Ile Asp Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Ala Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
        915                 920                 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Ala Thr His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Val  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050

Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
    1055                1060                1065
```

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```
Asn Leu  Thr Ala Ala Thr Thr  Ala Ile Ile Thr Ser  Ser Leu Gly
    1070                1075                1080

Ile Ala  Ser Gly Phe Ser Ile  Leu Leu Val Pro Leu  Ala Gly Ile
    1085                1090                1095

Ser Ala  Gly Ile Pro Ser Leu  Val Asn Asn Glu Leu  Ile Leu Arg
    1100                1105                1110

Asp Lys  Ala Thr Lys Val Val  Asp Tyr Phe Ser His  Ile Ser Leu
    1115                1120                1125

Ala Glu  Ser Glu Gly Ala Phe  Thr Ser Leu Asp Asp  Lys Ile Met
    1130                1135                1140

Met Pro  Gln Asp Asp Leu Val  Ile Ser Glu Ile Asp  Phe Asn Asn
    1145                1150                1155

Asn Ser  Ile Thr Leu Gly Lys  Cys Glu Ile Trp Arg  Met Glu Gly
    1160                1165                1170

Gly Ser  Gly His Thr Val Thr  Asp Asp Ile Asp His  Phe Phe Ser
    1175                1180                1185

Ala Pro  Ser Ile Thr Tyr Arg  Glu Pro His Leu Ser  Ile Tyr Asp
    1190                1195                1200

Val Leu  Glu Val Gln Lys Glu  Glu Leu Asp Leu Ser  Lys Asp Leu
    1205                1210                1215

Met Val  Leu Pro Asn Ala Pro  Asn Arg Val Phe Ala  Trp Glu Thr
    1220                1225                1230

Gly Trp  Thr Pro Gly Leu Arg  Ser Leu Glu Asn Asp  Gly Thr Lys
    1235                1240                1245

Leu Leu  Asp Arg Ile Arg Asp  Asn Tyr Glu Gly Glu  Phe Tyr Trp
    1250                1255                1260
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Arg Tyr  Phe Ala Phe Ile Ala  Asp Ala Leu Ile Thr  Thr Leu Lys
    1265                1270                1275

Pro Arg  Tyr Glu Asp Thr Asn  Ile Arg Ile Asn Leu  Asp Ser Asn
    1280                1285                1290

Thr Arg  Ser Phe Ile Val Pro  Val Ile Thr Thr Glu  Tyr Ile Arg
    1295                1300                1305

Glu Lys  Leu Ser Tyr Ser Phe  Tyr Gly Ser Gly Gly  Thr Tyr Ala
    1310                1315                1320

Leu Ser  Leu Ser Gln Tyr Asn  Met Asn Ile Asn Ile  Glu Leu Asn
    1325                1330                1335

Glu Asn  Asp Thr Trp Val Ile  Asp Val Asp Asn Val  Val Arg Asp
    1340                1345                1350

Val Thr  Ile Glu Ser Asp Lys  Ile Lys Lys Gly Asp  Leu Ile Glu
    1355                1360                1365

Asn Ile  Leu Ser Lys Leu Ser  Ile Glu Asp Asn Lys  Ile Ile Leu
    1370                1375                1380

Asp Asn  His Glu Ile Asn Phe  Ser Gly Thr Leu Asn  Gly Gly Asn
    1385                1390                1395

Gly Phe  Val Ser Leu Thr Phe  Ser Ile Leu Glu Gly  Ile Asn Ala
    1400                1405                1410

Val Ile  Glu Val Asp Leu Leu  Ser Lys Ser Tyr Lys  Val Leu Ile
    1415                1420                1425

Ser Gly  Glu Leu Lys Thr Leu  Met Ala Asn Ser Asn  Ser Val Gln
    1430                1435                1440

Gln Lys  Ile Asp Tyr Ile Gly  Leu Asn Ser Glu Leu  Gln Lys Asn
    1445                1450                1455
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Ile Pro Tyr Ser Phe Met Asp Asp Lys Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Cys Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Ser
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asn Ser Lys Pro
1490 1495 1500

Leu Phe Gly Tyr Cys Ser Asn Asp Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asp Val Ile Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Phe Thr Ile Gln Asp Glu Asn Thr
1535 1540 1545

Ile Lys Leu Asn Gly Val Tyr Leu Asp Glu Asn Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Lys Lys Gly Ser Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe
1580 1585 1590

Ile Asn Ser Leu Gln Ser Asn Thr Lys Leu Ile Leu Asp Thr Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Lys Asp Asn Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Lys Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

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Met Ile  Val Glu Pro Asn Tyr  Asp Leu Asp Asp Ser  Gly Asp Ile
    1655                1660                1665

Ser Ser  Thr Val Ile Asn Phe  Ser Gln Lys Tyr Leu  Tyr Gly Ile
    1670                1675                1680

Asp Ser  Cys Val Asn Lys Val  Ile Ile Ser Pro Asn  Ile Tyr Thr
    1685                1690                1695

Asp Glu  Ile Asn Ile Thr Pro  Ile Tyr Glu Ala Asn  Asn Thr Tyr
    1700                1705                1710

Pro Glu  Val Ile Val Leu Asp  Thr Asn Tyr Ile Ser  Glu Lys Ile
    1715                1720                1725

Asn Ile  Asn Ile Asn Asp Leu  Ser Ile Arg Tyr Val  Trp Ser Asn
    1730                1735                1740

Asp Gly  Ser Asp Phe Ile Leu  Met Ser Thr Asp Glu  Glu Asn Lys
    1745                1750                1755

Val Ser  Gln Val Lys Ile Arg  Phe Thr Asn Val Phe  Lys Gly Asn
    1760                1765                1770

Thr Ile  Ser Asp Lys Ile Ser  Phe Asn Phe Ser Asp  Lys Gln Asp
    1775                1780                1785

Val Ser  Ile Asn Lys Val Ile  Ser Thr Phe Thr Pro  Ser Tyr Tyr
    1790                1795                1800

Val Glu  Gly Leu Leu Asn Tyr  Asp Leu Gly Leu Ile  Ser Leu Tyr
    1805                1810                1815

Asn Glu  Lys Phe Tyr Ile Asn  Asn Phe Gly Met Met  Val Ser Gly
    1820                1825                1830

Leu Val  Tyr Ile Asn Asp Ser  Leu Tyr Tyr Phe Lys  Pro Pro Ile
    1835                1840                1845
```

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Lys Asn Leu Ile Thr Gly Phe Thr Thr Ile Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Asp Asn Gly Gly Ala Ala Ser Val Gly Glu Thr
1865 1870 1875

Ile Ile Asp Gly Lys Asn Tyr Tyr Phe Ser Gln Asn Gly Val Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asp Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Thr Ile Asp Glu Asn Val Tyr Tyr Phe Gly
1925 1930 1935

Asp Asn Tyr Arg Ala Ala Ile Glu Trp Gln Thr Leu Asp Asp Glu
1940 1945 1950

Val Tyr Tyr Phe Ser Thr Asp Thr Gly Arg Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Asp Lys Phe Tyr Phe Asn Ser Asp Gly Ile
1970 1975 1980

Met Gln Lys Gly Phe Val Asn Ile Asn Asp Lys Thr Phe Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Ser Gly Tyr Thr Glu Ile Asp Gly
2000 2005 2010

Lys Tyr Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Ala Asp Gly Phe Lys Tyr Phe Ala His His Asp Glu
2030 2035 2040

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Asp Leu Gly Asn Glu Glu Gly Glu Ala Leu Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Ile Ser Ile Ile
2090 2095 2100

Asn Asp Gly Lys Tyr Tyr Phe Asn Asp Ser Gly Ile Met Gln Ile
2105 2110 2115

Gly Phe Val Thr Ile Asn Asn Glu Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Val Glu Ser Gly Met Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Glu Asn Gly Leu Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asp Pro Glu Thr Lys Lys Ala Tyr Lys Gly Ile Asn Val Ile Asp
2225 2230 2235

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Asp Ile Lys Tyr Tyr Phe Asp Glu Asn Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Thr Phe Glu Asp Asn His Tyr Tyr Phe Asn Glu Asp Gly
2255 2260 2265

Ile Met Gln Tyr Gly Tyr Leu Asn Ile Glu Asp Lys Thr Phe Tyr
2270 2275 2280

Phe Ser Glu Asp Gly Ile Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 221
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 221

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

```
Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
            20                  25                  30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Ala Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220
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Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430
```

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```
Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Gln Met Ala Ser Leu Ala Ser Phe Asp Asp Ala Arg Ala Lys Ala
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545                 550                 555                 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
            580                 585                 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
        595                 600                 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
    610                 615                 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625                 630                 635                 640
```

```
Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
                645                 650                 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
            660                 665                 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
        675                 680                 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
    690                 695                 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705                 710                 715                 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
                725                 730                 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
            740                 745                 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
        755                 760                 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
    770                 775                 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785                 790                 795                 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
                805                 810                 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
            820                 825                 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
        835                 840                 845
```

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```
Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
    850                 855                 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865                 870                 875                 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
                885                 890                 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
        915                 920                 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Ile  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050
```

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```
Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
    1055                1060                1065

Asn Leu  Thr Thr Ala Thr Thr  Ala Ile Ile Thr Ser  Ser Leu Gly
    1070                1075                1080

Ile Ala  Ser Gly Phe Ser Ile  Leu Leu Val Pro Leu  Ala Gly Ile
    1085                1090                1095

Ser Ala  Gly Ile Pro Ser Leu  Val Asn Asn Glu Leu  Val Leu Arg
    1100                1105                1110

Asp Lys  Ala Thr Lys Val Val  Asp Tyr Phe Lys His  Val Ser Leu
    1115                1120                1125

Val Glu  Thr Glu Gly Val Phe  Thr Leu Leu Asp Asp  Lys Ile Met
    1130                1135                1140

Met Pro  Gln Asp Asp Leu Val  Ile Ser Glu Ile Asp  Phe Asn Asn
    1145                1150                1155

Asn Ser  Ile Val Leu Gly Lys  Cys Glu Ile Trp Arg  Met Glu Gly
    1160                1165                1170

Gly Ser  Gly His Thr Val Thr  Asp Asp Ile Asp His  Phe Phe Ser
    1175                1180                1185

Ala Pro  Ser Ile Thr Tyr Arg  Glu Pro His Leu Ser  Ile Tyr Asp
    1190                1195                1200

Val Leu  Glu Val Gln Lys Glu  Glu Leu Asp Leu Ser  Lys Asp Leu
    1205                1210                1215

Met Val  Leu Pro Asn Ala Pro  Asn Arg Val Phe Ala  Trp Glu Thr
    1220                1225                1230

Gly Trp  Thr Pro Gly Leu Arg  Ser Leu Glu Asn Asp  Gly Thr Lys
    1235                1240                1245
```

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```
Leu Leu  Asp Arg Ile Arg Asp  Asn Tyr Glu Gly Glu  Phe Tyr Trp
    1250                1255                1260

Arg Tyr  Phe Ala Phe Ile Ala  Asp Ala Leu Ile Thr  Thr Leu Lys
    1265                1270                1275

Pro Arg  Tyr Glu Asp Thr Asn  Ile Arg Ile Asn Leu  Asp Ser Asn
    1280                1285                1290

Thr Arg  Ser Phe Ile Val Pro  Ile Ile Thr Thr Glu  Tyr Ile Arg
    1295                1300                1305

Glu Lys  Leu Ser Tyr Ser Phe  Tyr Gly Ser Gly Gly  Thr Tyr Ala
    1310                1315                1320

Leu Ser  Leu Ser Gln Tyr Asn  Met Gly Ile Asn Ile  Glu Leu Ser
    1325                1330                1335

Glu Ser  Asp Val Trp Ile Ile  Asp Val Asp Asn Val  Val Arg Asp
    1340                1345                1350

Val Thr  Ile Glu Ser Asp Lys  Ile Lys Lys Gly Asp  Leu Ile Glu
    1355                1360                1365

Gly Ile  Leu Ser Thr Leu Ser  Ile Glu Glu Asn Lys  Ile Ile Leu
    1370                1375                1380

Asn Ser  His Glu Ile Asn Phe  Ser Gly Glu Val Asn  Gly Ser Asn
    1385                1390                1395

Gly Phe  Val Ser Leu Thr Phe  Ser Ile Leu Glu Gly  Ile Asn Ala
    1400                1405                1410

Ile Ile  Glu Val Asp Leu Leu  Ser Lys Ser Tyr Lys  Leu Leu Ile
    1415                1420                1425

Ser Gly  Glu Leu Lys Ile Leu  Met Leu Asn Ser Asn  His Ile Gln
    1430                1435                1440
```

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Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys Thr
1535 1540 1545

Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Arg Lys Gly Asn Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe
1580 1585 1590

Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

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```
Thr Leu  Glu Thr Asn Tyr Thr  Leu Tyr Val Gly Asn  Arg Gln Asn
    1640                1645                1650

Met Ile  Val Glu Pro Asn Tyr  Asp Leu Asp Asp Ser  Gly Asp Ile
    1655                1660                1665

Ser Ser  Thr Val Ile Asn Phe  Ser Gln Lys Tyr Leu  Tyr Gly Ile
    1670                1675                1680

Asp Ser  Cys Val Asn Lys Val  Val Ile Ser Pro Asn  Ile Tyr Thr
    1685                1690                1695

Asp Glu  Ile Asn Ile Thr Pro  Val Tyr Glu Thr Asn  Asn Thr Tyr
    1700                1705                1710

Pro Glu  Val Ile Val Leu Asp  Ala Asn Tyr Ile Asn  Glu Lys Ile
    1715                1720                1725

Asn Val  Asn Ile Asn Asp Leu  Ser Ile Arg Tyr Val  Trp Ser Asn
    1730                1735                1740

Asp Gly  Asn Asp Phe Ile Leu  Met Ser Thr Ser Glu  Glu Asn Lys
    1745                1750                1755

Val Ser  Gln Val Lys Ile Arg  Phe Val Asn Val Phe  Lys Asp Lys
    1760                1765                1770

Thr Leu  Ala Asn Lys Leu Ser  Phe Asn Phe Ser Asp  Lys Gln Asp
    1775                1780                1785

Val Pro  Val Ser Glu Ile Ile  Leu Ser Phe Thr Pro  Ser Tyr Tyr
    1790                1795                1800

Glu Asp  Gly Leu Ile Gly Tyr  Asp Leu Gly Leu Val  Ser Leu Tyr
    1805                1810                1815

Asn Glu  Lys Phe Tyr Ile Asn  Asn Phe Gly Met Met  Val Ser Gly
    1820                1825                1830
```

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```
Leu Ile  Tyr Ile Asn Asp Ser  Leu Tyr Tyr Phe Lys  Pro Pro Val
    1835                1840                1845

Asn Asn  Leu Ile Thr Gly Phe  Val Thr Val Gly Asp  Asp Lys Tyr
    1850                1855                1860

Tyr Phe  Asn Pro Ile Asn Gly  Gly Ala Ala Ser Ile  Gly Glu Thr
    1865                1870                1875

Ile Ile  Asp Asp Lys Asn Tyr  Tyr Phe Asn Gln Ser  Gly Val Leu
    1880                1885                1890

Gln Thr  Gly Val Phe Ser Thr  Glu Asp Gly Phe Lys  Tyr Phe Ala
    1895                1900                1905

Pro Ala  Asn Thr Leu Asp Glu  Asn Leu Glu Gly Glu  Ala Ile Asp
    1910                1915                1920

Phe Thr  Gly Lys Leu Ile Ile  Asp Glu Asn Ile Tyr  Tyr Phe Asp
    1925                1930                1935

Asp Asn  Tyr Arg Gly Ala Val  Glu Trp Lys Glu Leu  Asp Gly Glu
    1940                1945                1950

Met His  Tyr Phe Ser Pro Glu  Thr Gly Lys Ala Phe  Lys Gly Leu
    1955                1960                1965

Asn Gln  Ile Gly Asp Tyr Lys  Tyr Tyr Phe Asn Ser  Asp Gly Val
    1970                1975                1980

Met Gln  Lys Gly Phe Val Ser  Ile Asn Asp Asn Lys  His Tyr Phe
    1985                1990                1995

Asp Asp  Ser Gly Val Met Lys  Val Gly Tyr Thr Glu  Ile Asp Gly
    2000                2005                2010

Lys His  Phe Tyr Phe Ala Glu  Asn Gly Glu Met Gln  Ile Gly Val
    2015                2020                2025
```

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```
Phe Asn  Thr Glu Asp Gly Phe  Lys Tyr Phe Ala His  His Asn Glu
    2030                2035                2040

Asp Leu  Gly Asn Glu Glu Gly  Glu Glu Ile Ser Tyr  Ser Gly Ile
    2045                2050                2055

Leu Asn  Phe Asn Asn Lys Ile  Tyr Tyr Phe Asp Asp  Ser Phe Thr
    2060                2065                2070

Ala Val  Val Gly Trp Lys Asp  Leu Glu Asp Gly Ser  Lys Tyr Tyr
    2075                2080                2085

Phe Asp  Glu Asp Thr Ala Glu  Ala Tyr Ile Gly Leu  Ser Leu Ile
    2090                2095                2100

Asn Asp  Gly Gln Tyr Tyr Phe  Asn Asp Asp Gly Ile  Met Gln Val
    2105                2110                2115

Gly Phe  Val Thr Ile Asn Asp  Lys Val Phe Tyr Phe  Ser Asp Ser
    2120                2125                2130

Gly Ile  Ile Glu Ser Gly Val  Gln Asn Ile Asp Asp  Asn Tyr Phe
    2135                2140                2145

Tyr Ile  Asp Asp Asn Gly Ile  Val Gln Ile Gly Val  Phe Asp Thr
    2150                2155                2160

Ser Asp  Gly Tyr Lys Tyr Phe  Ala Pro Ala Asn Thr  Val Asn Asp
    2165                2170                2175

Asn Ile  Tyr Gly Gln Ala Val  Glu Tyr Ser Gly Leu  Val Arg Val
    2180                2185                2190

Gly Glu  Asp Val Tyr Tyr Phe  Gly Glu Thr Tyr Thr  Ile Glu Thr
    2195                2200                2205

Gly Trp  Ile Tyr Asp Met Glu  Asn Glu Ser Asp Lys  Tyr Tyr Phe
    2210                2215                2220
```

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Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

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<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<220>
<221> VARIANT
<222> (101)..(101)

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<223> Xaa is any amino acid, but not Trp

<220>
<221> VARIANT
<222> (287)..(287)
<223> Xaa is any amino acid, but not Asp

<220>
<221> VARIANT
<222> (514)..(514)
<223> Xaa is any amino acid, but not Glu

<220>
<221> VARIANT
<222> (519)..(519)
<223> Xaa is any amino acid, but not Trp

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<221> VARIANT
<222> (697)..(697)
<223> Xaa is any amino acid, but not Cys

<400> 222

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Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1               5                   10                  15


Arg Val Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
            20                  25                  30


Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45


Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60


Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80


Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95


Leu His Phe Val Xaa Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110
```

```
Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Val Glu Ser Ala Thr Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Tyr Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Thr Gln
            180                 185                 190

Arg Glu Glu Asn Pro Asp Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Asp Ile Asp Glu Leu Asn Ser Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Val Thr Glu Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Gly Gly Glu Ser Phe Lys Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Val Gly Gly Val Tyr Leu Asp Val Xaa Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Val Lys Leu Glu Ala Ile Met
305                 310                 315                 320
```

```
Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Ala Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Xaa Met Ala Ser Leu Xaa Ser Phe Asp Asp Ala Arg Ala Lys Ala
        515                 520                 525
```

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```
Gln Phe Glu Glu Tyr Lys Lys Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Thr Val Val Asp Lys Glu Tyr
545                 550                 555                 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
            580                 585                 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
        595                 600                 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
    610                 615                 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625                 630                 635                 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
                645                 650                 655

Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser Thr
            660                 665                 670

Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
        675                 680                 685

Ser Ile Glu Ile Asn Leu Leu Gly Xaa Asn Met Phe Ser Tyr Ser Val
    690                 695                 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Arg Val Lys Asp
705                 710                 715                 720

Lys Val Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
                725                 730                 735
```

```
Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
            740                 745                 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
        755                 760                 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
    770                 775                 780

Lys Ile Ile Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785                 790                 795                 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
                805                 810                 815

Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
            820                 825                 830

Thr Gln Val Val Glu Gly Arg Ile Glu Glu Ala Lys Ser Leu Thr Ser
        835                 840                 845

Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser Ile
    850                 855                 860

Ser Asp Ala Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Glu Glu Ser
865                 870                 875                 880

His Phe Ile Ser Phe Glu Asp Ile Leu Glu Thr Asp Glu Gly Phe Ser
                885                 890                 895

Ile Arg Phe Ile Asp Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Ala Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
        915                 920                 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940
```

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```
Lys Lys Val Asn Leu Asp Ala Thr His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Val  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050

Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
    1055                1060                1065

Asn Leu  Thr Ala Ala Thr Thr  Ala Ile Ile Thr Ser  Ser Leu Gly
    1070                1075                1080

Ile Ala  Ser Gly Phe Ser Ile  Leu Leu Val Pro Leu  Ala Gly Ile
    1085                1090                1095

Ser Ala  Gly Ile Pro Ser Leu  Val Asn Asn Glu Leu  Ile Leu Arg
    1100                1105                1110

Asp Lys  Ala Thr Lys Val Val  Asp Tyr Phe Ser His  Ile Ser Leu
    1115                1120                1125

Ala Glu  Ser Glu Gly Ala Phe  Thr Ser Leu Asp Asp  Lys Ile Met
    1130                1135                1140
```

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```
Met Pro  Gln Asp Asp Leu Val  Ile Ser Glu Ile Asp  Phe Asn Asn
    1145                1150                1155

Asn Ser  Ile Thr Leu Gly Lys  Cys Glu Ile Trp Arg  Met Glu Gly
    1160                1165                1170

Gly Ser  Gly His Thr Val Thr  Asp Asp Ile Asp His  Phe Phe Ser
    1175                1180                1185

Ala Pro  Ser Ile Thr Tyr Arg  Glu Pro His Leu Ser  Ile Tyr Asp
    1190                1195                1200

Val Leu  Glu Val Gln Lys Glu  Glu Leu Asp Leu Ser  Lys Asp Leu
    1205                1210                1215

Met Val  Leu Pro Asn Ala Pro  Asn Arg Val Phe Ala  Trp Glu Thr
    1220                1225                1230

Gly Trp  Thr Pro Gly Leu Arg  Ser Leu Glu Asn Asp  Gly Thr Lys
    1235                1240                1245

Leu Leu  Asp Arg Ile Arg Asp  Asn Tyr Glu Gly Glu  Phe Tyr Trp
    1250                1255                1260

Arg Tyr  Phe Ala Phe Ile Ala  Asp Ala Leu Ile Thr  Thr Leu Lys
    1265                1270                1275

Pro Arg  Tyr Glu Asp Thr Asn  Ile Arg Ile Asn Leu  Asp Ser Asn
    1280                1285                1290

Thr Arg  Ser Phe Ile Val Pro  Val Ile Thr Thr Glu  Tyr Ile Arg
    1295                1300                1305

Glu Lys  Leu Ser Tyr Ser Phe  Tyr Gly Ser Gly Gly  Thr Tyr Ala
    1310                1315                1320

Leu Ser  Leu Ser Gln Tyr Asn  Met Asn Ile Asn Ile  Glu Leu Asn
    1325                1330                1335
```

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```
Glu Asn  Asp Thr Trp Val Ile  Asp Val Asp Asn Val  Val Arg Asp
    1340                1345                1350

Val Thr  Ile Glu Ser Asp Lys  Ile Lys Lys Gly Asp  Leu Ile Glu
    1355                1360                1365

Asn Ile  Leu Ser Lys Leu Ser  Ile Glu Asp Asn Lys  Ile Ile Leu
    1370                1375                1380

Asp Asn  His Glu Ile Asn Phe  Ser Gly Thr Leu Asn  Gly Gly Asn
    1385                1390                1395

Gly Phe  Val Ser Leu Thr Phe  Ser Ile Leu Glu Gly  Ile Asn Ala
    1400                1405                1410

Val Ile  Glu Val Asp Leu Leu  Ser Lys Ser Tyr Lys  Val Leu Ile
    1415                1420                1425

Ser Gly  Glu Leu Lys Thr Leu  Met Ala Asn Ser Asn  Ser Val Gln
    1430                1435                1440

Gln Lys  Ile Asp Tyr Ile Gly  Leu Asn Ser Glu Leu  Gln Lys Asn
    1445                1450                1455

Ile Pro  Tyr Ser Phe Met Asp  Asp Lys Gly Lys Glu  Asn Gly Phe
    1460                1465                1470

Ile Asn  Cys Ser Thr Lys Glu  Gly Leu Phe Val Ser  Glu Leu Ser
    1475                1480                1485

Asp Val  Val Leu Ile Ser Lys  Val Tyr Met Asp Asn  Ser Lys Pro
    1490                1495                1500

Leu Phe  Gly Tyr Cys Ser Asn  Asp Leu Lys Asp Val  Lys Val Ile
    1505                1510                1515

Thr Lys  Asp Asp Val Ile Ile  Leu Thr Gly Tyr Tyr  Leu Lys Asp
    1520                1525                1530
```

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Asp Ile Lys Ile Ser Leu Ser Phe Thr Ile Gln Asp Glu Asn Thr
1535 1540 1545

Ile Lys Leu Asn Gly Val Tyr Leu Asp Glu Asn Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Lys Lys Gly Ser Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe
1580 1585 1590

Ile Asn Ser Leu Gln Ser Asn Thr Lys Leu Ile Leu Asp Thr Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Lys Asp Asn Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Lys Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Ile Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Ile Tyr Glu Ala Asn Asn Thr Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Thr Asn Tyr Ile Ser Glu Lys Ile
1715 1720 1725

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```
Asn Ile  Asn Ile Asn Asp Leu  Ser Ile Arg Tyr Val  Trp Ser Asn
    1730                1735                1740

Asp Gly  Ser Asp Phe Ile Leu  Met Ser Thr Asp Glu  Glu Asn Lys
    1745                1750                1755

Val Ser  Gln Val Lys Ile Arg  Phe Thr Asn Val Phe  Lys Gly Asn
    1760                1765                1770

Thr Ile  Ser Asp Lys Ile Ser  Phe Asn Phe Ser Asp  Lys Gln Asp
    1775                1780                1785

Val Ser  Ile Asn Lys Val Ile  Ser Thr Phe Thr Pro  Ser Tyr Tyr
    1790                1795                1800

Val Glu  Gly Leu Leu Asn Tyr  Asp Leu Gly Leu Ile  Ser Leu Tyr
    1805                1810                1815

Asn Glu  Lys Phe Tyr Ile Asn  Asn Phe Gly Met Met  Val Ser Gly
    1820                1825                1830

Leu Val  Tyr Ile Asn Asp Ser  Leu Tyr Tyr Phe Lys  Pro Pro Ile
    1835                1840                1845

Lys Asn  Leu Ile Thr Gly Phe  Thr Thr Ile Gly Asp  Asp Lys Tyr
    1850                1855                1860

Tyr Phe  Asn Pro Asp Asn Gly  Gly Ala Ala Ser Val  Gly Glu Thr
    1865                1870                1875

Ile Ile  Asp Gly Lys Asn Tyr  Tyr Phe Ser Gln Asn  Gly Val Leu
    1880                1885                1890

Gln Thr  Gly Val Phe Ser Thr  Glu Asp Gly Phe Lys  Tyr Phe Ala
    1895                1900                1905

Pro Ala  Asp Thr Leu Asp Glu  Asn Leu Glu Gly Glu  Ala Ile Asp
    1910                1915                1920
```

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```
Phe Thr  Gly Lys Leu Thr Ile  Asp Glu Asn Val Tyr  Tyr Phe Gly
    1925                1930                1935

Asp Asn  Tyr Arg Ala Ala Ile  Glu Trp Gln Thr Leu  Asp Asp Glu
    1940                1945                1950

Val Tyr  Tyr Phe Ser Thr Asp  Thr Gly Arg Ala Phe  Lys Gly Leu
    1955                1960                1965

Asn Gln  Ile Gly Asp Asp Lys  Phe Tyr Phe Asn Ser  Asp Gly Ile
    1970                1975                1980

Met Gln  Lys Gly Phe Val Asn  Ile Asn Asp Lys Thr  Phe Tyr Phe
    1985                1990                1995

Asp Asp  Ser Gly Val Met Lys  Ser Gly Tyr Thr Glu  Ile Asp Gly
    2000                2005                2010

Lys Tyr  Phe Tyr Phe Ala Glu  Asn Gly Glu Met Gln  Ile Gly Val
    2015                2020                2025

Phe Asn  Thr Ala Asp Gly Phe  Lys Tyr Phe Ala His  His Asp Glu
    2030                2035                2040

Asp Leu  Gly Asn Glu Glu Gly  Glu Ala Leu Ser Tyr  Ser Gly Ile
    2045                2050                2055

Leu Asn  Phe Asn Asn Lys Ile  Tyr Tyr Phe Asp Asp  Ser Phe Thr
    2060                2065                2070

Ala Val  Val Gly Trp Lys Asp  Leu Glu Asp Gly Ser  Lys Tyr Tyr
    2075                2080                2085

Phe Asp  Glu Asp Thr Ala Glu  Ala Tyr Ile Gly Ile  Ser Ile Ile
    2090                2095                2100

Asn Asp  Gly Lys Tyr Tyr Phe  Asn Asp Ser Gly Ile  Met Gln Ile
    2105                2110                2115
```

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Gly Phe Val Thr Ile Asn Asn Glu Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Val Glu Ser Gly Met Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Glu Asn Gly Leu Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asp Pro Glu Thr Lys Lys Ala Tyr Lys Gly Ile Asn Val Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Asn Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Thr Phe Glu Asp Asn His Tyr Tyr Phe Asn Glu Asp Gly
2255 2260 2265

Ile Met Gln Tyr Gly Tyr Leu Asn Ile Glu Asp Lys Thr Phe Tyr
2270 2275 2280

Phe Ser Glu Asp Gly Ile Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

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Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 223
<211> 769
<212> PRT
<213> Clostridium difficile

<400> 223

Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1 5 10 15

Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
20 25 30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
35 40 45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr
50 55 60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65 70 75 80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
100 105 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu

```
        115                 120                 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
    130                 135                 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
    290                 295                 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
```

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325 330 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
340 345 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
355 360 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
370 375 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385 390 395 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
405 410 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
420 425 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
435 440 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
450 455 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465 470 475 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
485 490 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
500 505 510

Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
515 520 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu

530 535 540

Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545 550 555 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
565 570 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
580 585 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
595 600 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
610 615 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625 630 635 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
645 650 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
660 665 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
675 680 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
690 695 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705 710 715 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser
725 730 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly

740 745 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
755 760 765

Ala

<210> 224
<211> 541
<212> PRT
<213> Clostridium difficile

<400> 224

Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1 5 10 15

Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
20 25 30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
35 40 45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr
50 55 60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65 70 75 80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
100 105 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
115 120 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
130 135 140

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Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145 150 155 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
165 170 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
180 185 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
195 200 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg
210 215 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225 230 235 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
245 250 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
260 265 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
275 280 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
290 295 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
325 330 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
340 345 350

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Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
355 360 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
370 375 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385 390 395 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
405 410 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
420 425 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
435 440 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
450 455 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465 470 475 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
485 490 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
500 505 510

Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
515 520 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 225
<211> 228

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<212> PRT
<213> Clostridium difficile

<400> 225

Leu Ser Glu Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp
1 5 10 15

Lys Asn Tyr Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu
20 25 30

Ala Gly Ser Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp
35 40 45

Asp Ile Ser Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys
50 55 60

Asn Ser Ile Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr
65 70 75 80

Phe Leu Ser Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg
85 90 95

Ile Pro Glu Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile
100 105 110

Gly His Gly Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser
115 120 125

Val Asp Ser Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys
130 135 140

Leu Asp Ile Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn
145 150 155 160

Met Phe Ser Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu
165 170 175

Leu Leu Ser Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn
180 185 190

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Lys Asn Ser Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn
195 200 205

Ser Glu Gly Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn
210 215 220

Lys Glu Glu Ala
225

<210> 226
<211> 1039
<212> PRT
<213> Clostridium difficile

<400> 226

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
1 5 10 15

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
20 25 30

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
35 40 45

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
50 55 60

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
65 70 75 80

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
85 90 95

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
100 105 110

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
115 120 125

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```
Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
    130                 135                 140

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
145                 150                 155                 160

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
                165                 170                 175

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
            180                 185                 190

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
        195                 200                 205

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
    210                 215                 220

Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln Leu
225                 230                 235                 240

Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val Leu Pro
                245                 250                 255

Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu Asp Gly Ile
            260                 265                 270

Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu His Asp Pro Leu
        275                 280                 285

Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val Leu Ala Ile Asn Met
    290                 295                 300

Ser Leu Ser Ile Ala Ala Thr Val Ala Ser Ile Val Gly Ile Gly Ala
305                 310                 315                 320

Glu Val Thr Ile Phe Leu Leu Pro Ile Ala Gly Ile Ser Ala Gly Ile
                325                 330                 335
```

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```
Pro Ser Leu Val Asn Asn Glu Leu Ile Leu His Asp Lys Ala Thr Ser
            340                 345                 350

Val Val Asn Tyr Phe Asn His Leu Ser Glu Ser Lys Lys Tyr Gly Pro
        355                 360                 365

Leu Lys Thr Glu Asp Asp Lys Ile Leu Val Pro Ile Asp Asp Leu Val
    370                 375                 380

Ile Ser Glu Ile Asp Phe Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys
385                 390                 395                 400

Asn Ile Leu Ala Met Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn
                405                 410                 415

Ile Asp His Phe Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser
            420                 425                 430

Leu Ser Ile Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe
        435                 440                 445

Ser Lys Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp
    450                 455                 460

Trp Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly
465                 470                 475                 480

Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe Tyr
                485                 490                 495

Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu Lys Pro
            500                 505                 510

Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys Asp Thr Arg
        515                 520                 525

Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile Arg Asn Lys Leu
    530                 535                 540
```

```
Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr Ser Leu Leu Leu Ser
545                 550                 555                 560

Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu Ser Lys Asp Asp Leu Trp
                565                 570                 575

Ile Phe Asn Ile Asp Asn Glu Val Arg Glu Ile Ser Ile Glu Asn Gly
            580                 585                 590

Thr Ile Lys Lys Gly Lys Leu Ile Lys Asp Val Leu Ser Lys Ile Asp
        595                 600                 605

Ile Asn Lys Asn Lys Leu Ile Ile Gly Asn Gln Thr Ile Asp Phe Ser
    610                 615                 620

Gly Asp Ile Asp Asn Lys Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu
625                 630                 635                 640

Asp Asp Lys Ile Ser Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser
                645                 650                 655

Tyr Ser Leu Leu Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu
            660                 665                 670

Ser Asn Ile Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn
        675                 680                 685

Ile Ala Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala
    690                 695                 700

Ile Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
705                 710                 715                 720

Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe Asn Ser
                725                 730                 735

Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp Asp Ile
            740                 745                 750
```

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```
Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr Asp Lys Ser
        755                 760                 765

Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln Val Lys Val Asn
    770                 775                 780

Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser Tyr Leu Asp Phe Val
785                 790                 795                 800

Lys Asn Ser Asp Gly His His Asn Thr Ser Asn Phe Met Asn Leu Phe
                805                 810                 815

Leu Asp Asn Ile Ser Phe Trp Lys Leu Phe Gly Phe Glu Asn Ile Asn
            820                 825                 830

Phe Val Ile Asp Lys Tyr Phe Thr Leu Val Gly Lys Thr Asn Leu Gly
        835                 840                 845

Tyr Val Glu Phe Ile Cys Asp Asn Asn Lys Asn Ile Asp Ile Tyr Phe
    850                 855                 860

Gly Glu Trp Lys Thr Ser Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn
865                 870                 875                 880

Gly Arg Asn Val Val Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu
                885                 890                 895

Asp Ile Ser Thr Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile
            900                 905                 910

Asp Arg Tyr Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser
        915                 920                 925

Leu Ile Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu
    930                 935                 940

Ile Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
945                 950                 955                 960
```

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Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser Asp
965 970 975

Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile Leu Gln
980 985 990

Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser Phe Asn Lys
995 1000 1005

Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser Leu Gly Tyr
1010 1015 1020

Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn Glu Leu Asp
1025 1030 1035

Arg

<210> 227
<211> 266
<212> PRT
<213> Clostridium difficile

<400> 227

Ala Glu Asp Ile Asn Val Phe Met Lys Asp Asp Ile Asn Thr Ile Thr
1 5 10 15

Gly Lys Tyr Tyr Val Asp Asn Asn Thr Asp Lys Ser Ile Asp Phe Ser
20 25 30

Ile Ser Leu Val Ser Lys Asn Gln Val Lys Val Asn Gly Leu Tyr Leu
35 40 45

Asn Glu Ser Val Tyr Ser Ser Tyr Leu Asp Phe Val Lys Asn Ser Asp
50 55 60

Gly His His Asn Thr Ser Asn Phe Met Asn Leu Phe Leu Asp Asn Ile
65 70 75 80

Ser Phe Trp Lys Leu Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp

85 90 95

Lys Tyr Phe Thr Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe
100 105 110

Ile Cys Asp Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys
115 120 125

Thr Ser Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val
130 135 140

Val Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
145 150 155 160

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr Ile
165 170 175

Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile Asn Ile
180 185 190

Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile Ile Val Leu
195 200 205

Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn Leu Asp Ser Ser
210 215 220

Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser Asp Phe Ile Leu Val
225 230 235 240

Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile Leu Gln Lys Ile Arg Ile
245 250 255

Lys Gly Ile Leu Ser Asn Thr Gln Ser Phe
260 265

<210> 228
<211> 902
<212> PRT
<213> Clostridium difficile

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<400> 228

```
Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys Thr Tyr Tyr Tyr Asp
1               5                  10                  15

Glu Asp Ser Lys Leu Val Lys Gly Leu Ile Asn Ile Asn Asn Ser Leu
            20                  25                  30

Phe Tyr Phe Asp Pro Ile Glu Phe Asn Leu Val Thr Gly Trp Gln Thr
        35                  40                  45

Ile Asn Gly Lys Lys Tyr Tyr Phe Asp Ile Asn Thr Gly Ala Ala Leu
    50                  55                  60

Ile Ser Tyr Lys Ile Ile Asn Gly Lys His Phe Tyr Phe Asn Asn Asp
65                  70                  75                  80

Gly Val Met Gln Leu Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr
                85                  90                  95

Phe Ala Pro Ala Asn Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile
            100                 105                 110

Val Tyr Gln Ser Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe
        115                 120                 125

Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu
    130                 135                 140

Lys Tyr Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln
145                 150                 155                 160

Val Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
                165                 170                 175

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp Thr
            180                 185                 190

Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly Lys His
        195                 200                 205
```

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```
Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val Phe Ser Thr
    210                 215                 220

Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Tyr Asn Asn Asn
225                 230                 235                 240

Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys Phe Leu Thr Leu Asn
                245                 250                 255

Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser Lys Ala Val Thr Gly Trp
            260                 265                 270

Gln Thr Ile Asp Ser Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu
        275                 280                 285

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
    290                 295                 300

Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys
305                 310                 315                 320

Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr
                325                 330                 335

Ile Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln
            340                 345                 350

Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala
        355                 360                 365

Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn
    370                 375                 380

Glu Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser
385                 390                 395                 400

Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
                405                 410                 415
```

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```
Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn Asn
            420                 425                 430

Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly Tyr Ile
        435                 440                 445

Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn Glu Ser Lys
    450                 455                 460

Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala
465                 470                 475                 480

Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr
                485                 490                 495

Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn
            500                 505                 510

Asp Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr
        515                 520                 525

Tyr Phe Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
    530                 535                 540

Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu Ala Ala Thr
545                 550                 555                 560

Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
                565                 570                 575

Phe Ile Ala Ser Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr
            580                 585                 590

Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn
        595                 600                 605

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu
    610                 615                 620
```

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```
Gly Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
625                 630                 635                 640

Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
                645                 650                 655

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val
            660                 665                 670

Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn
        675                 680                 685

Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys His Phe
    690                 695                 700

Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro
705                 710                 715                 720

Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile
                725                 730                 735

Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp
            740                 745                 750

Asn Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr Gly Trp Val
        755                 760                 765

Thr Ile Asp Gly Asn Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly
    770                 775                 780

Ala Asn Gly Tyr Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn
785                 790                 795                 800

Gly Leu Pro Gln Ile Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr
                805                 810                 815

Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile
            820                 825                 830
```

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Arg Tyr Gln Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe
835 840 845

Gly Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys
850 855 860

Val Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
865 870 875 880

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
885 890 895

Ala Pro Gly Ile Tyr Gly
900

<210> 229
<211> 204
<212> PRT
<213> Clostridium difficile

<400> 229

Arg Tyr Tyr Phe Asp Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys
1 5 10 15

Thr Ile Asp Gly Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys
20 25 30

Ile Gly Val Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala
35 40 45

Asn Thr Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
50 55 60

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
65 70 75 80

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr Phe
85 90 95

```
Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly
            100                 105                 110

Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp
        115                 120                 125

Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Ile
    130                 135                 140

Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr Phe Asn
145                 150                 155                 160

Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe
                165                 170                 175

Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln
            180                 185                 190

Ala Ile Leu Tyr Gln Asn Glu Phe Leu Thr Leu Asn
        195                 200


<210>  230
<211>  457
<212>  PRT
<213>  Clostridium difficile

<400>  230

Ile Leu Gln Asn Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe
1               5                   10                  15

Asp Ala Asn Asn Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro
            20                  25                  30

Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile
        35                  40                  45

Glu Gly Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly
    50                  55                  60
```

```
Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
65                  70                  75                  80

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu Ala
                85                  90                  95

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu
            100                 105                 110

Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys
        115                 120                 125

Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr Gly Tyr Thr Ser
    130                 135                 140

Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile
145                 150                 155                 160

Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
                165                 170                 175

Thr His Asn Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Lys
            180                 185                 190

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
        195                 200                 205

Ala Val Thr Gly Leu Arg Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
    210                 215                 220

Thr Asn Thr Ala Val Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys
225                 230                 235                 240

Lys Tyr Tyr Phe Asn Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr
                245                 250                 255

Ile Ile Ser Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln
            260                 265                 270
```

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```
Ile Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala
        275                 280                 285

Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
    290                 295                 300

Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
305                 310                 315                 320

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr Phe
                325                 330                 335

Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile Asp Asn
            340                 345                 350

Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly Val Phe Lys
        355                 360                 365

Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn
    370                 375                 380

Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu His Leu
385                 390                 395                 400

Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Val Thr Gly
                405                 410                 415

Trp Gln Thr Ile Asn Gly Lys Val Tyr Tyr Phe Met Pro Asp Thr Ala
            420                 425                 430

Met Ala Ala Ala Gly Gly Leu Phe Glu Ile Asp Gly Val Ile Tyr Phe
        435                 440                 445

Phe Gly Val Asp Gly Val Lys Ala Pro
    450                 455


<210>  231
<211>  320
<212>  PRT
<213>  Clostridium difficile
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<400> 231

```
Ala Ser Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn
1               5                  10                  15

Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe
            20                  25                  30

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
        35                  40                  45

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr
    50                  55                  60

Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile Asp
65                  70                  75                  80

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr Gly
                85                  90                  95

Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ser
            100                 105                 110

Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys His Phe Tyr Phe
        115                 120                 125

Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly
    130                 135                 140

Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly
145                 150                 155                 160

Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn Ile
                165                 170                 175

Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr Ile
            180                 185                 190

Asp Gly Asn Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn
```

195 200 205

Gly Tyr Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu
210 215 220

Pro Gln Ile Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala
225 230 235 240

Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr
245 250 255

Gln Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
260 265 270

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
275 280 285

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe Glu
290 295 300

Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala Pro
305 310 315 320

<210> 232
<211> 864
<212> PRT
<213> Clostridium difficile

<400> 232

Phe Asp Pro Ile Glu Phe Asn Leu Val Thr Gly Trp Gln Thr Ile Asn
1 5 10 15

Gly Lys Lys Tyr Tyr Phe Asp Ile Asn Thr Gly Ala Ala Leu Ile Ser
20 25 30

Tyr Lys Ile Ile Asn Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val
35 40 45

Met Gln Leu Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala
50 55 60

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```
Pro Ala Asn Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr
65                  70                  75                  80

Gln Ser Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn
                85                  90                  95

Asp Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
            100                 105                 110

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val Ile
        115                 120                 125

Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile Ser Lys
    130                 135                 140

Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp Thr Asp Thr
145                 150                 155                 160

Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly Lys His Phe Tyr
                165                 170                 175

Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val Phe Ser Thr Ser Asn
            180                 185                 190

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Tyr Asn Asn Asn Ile Glu
        195                 200                 205

Gly Gln Ala Ile Val Tyr Gln Ser Lys Phe Leu Thr Leu Asn Gly Lys
    210                 215                 220

Lys Tyr Tyr Phe Asp Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr
225                 230                 235                 240

Ile Asp Ser Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
                245                 250                 255

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn
            260                 265                 270
```

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```
Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr
        275                 280                 285

Tyr Phe Asn Thr Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile
    290                 295                 300

Asn Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly
305                 310                 315                 320

Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
                325                 330                 335

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe
            340                 345                 350

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala
        355                 360                 365

Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe Asn Pro
    370                 375                 380

Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn Asn Asp Lys
385                 390                 395                 400

Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly Tyr Ile Thr Ile
                405                 410                 415

Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn Glu Ser Lys Met Val
            420                 425                 430

Thr Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala
        435                 440                 445

Asn Thr His Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Asn
    450                 455                 460

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp Ser
465                 470                 475                 480
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Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
485 490 495

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly
500 505 510

Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp
515 520 525

Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile
530 535 540

Ala Ser Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn
545 550 555 560

Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe
565 570 575

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
580 585 590

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr
595 600 605

Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile Asp
610 615 620

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr Gly
625 630 635 640

Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ser
645 650 655

Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys His Phe Tyr Phe
660 665 670

Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly
675 680 685

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Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly
690 695 700

Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn Ile
705 710 715 720

Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr Ile
725 730 735

Asp Gly Asn Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn
740 745 750

Gly Tyr Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu
755 760 765

Pro Gln Ile Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala
770 775 780

Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr
785 790 795 800

Gln Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
805 810 815

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
820 825 830

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe Glu
835 840 845

Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala Pro
850 855 860

<210> 233
<211> 403
<212> PRT
<213> Clostridium difficile

<400> 233

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Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp
1               5                  10                  15

Asn Asp Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys
            20                  25                  30

Tyr Tyr Phe Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr
        35                  40                  45

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu Ala Ala
    50                  55                  60

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn
65                  70                  75                  80

Thr Phe Ile Ala Ser Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe
                85                  90                  95

Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro
            100                 105                 110

Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile
        115                 120                 125

Glu Gly Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly
    130                 135                 140

Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg
145                 150                 155                 160

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
                165                 170                 175

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr
            180                 185                 190

Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys His
        195                 200                 205
```

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```
Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly
    210                 215                 220

Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn
225                 230                 235                 240

Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His
                245                 250                 255

Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr Gly Trp
            260                 265                 270

Val Thr Ile Asp Gly Asn Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Met
        275                 280                 285

Gly Ala Asn Gly Tyr Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe Arg
    290                 295                 300

Asn Gly Leu Pro Gln Ile Gly Val Phe Lys Gly Ser Asn Gly Phe Glu
305                 310                 315                 320

Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala
                325                 330                 335

Ile Arg Tyr Gln Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr
            340                 345                 350

Phe Gly Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly
        355                 360                 365

Lys Val Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly
    370                 375                 380

Leu Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
385                 390                 395                 400

Lys Ala Pro
```

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<210> 234
<211> 872
<212> PRT
<213> Clostridium difficile

<400> 234

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Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn Leu Val Thr Gly Trp
1               5                  10                  15

Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asp Ile Asn Thr Gly Ala
            20                  25                  30

Ala Leu Ile Ser Tyr Lys Ile Ile Asn Gly Lys His Phe Tyr Phe Asn
        35                  40                  45

Asn Asp Gly Val Met Gln Leu Gly Val Phe Lys Gly Pro Asp Gly Phe
    50                  55                  60

Glu Tyr Phe Ala Pro Ala Asn Thr Gln Asn Asn Asn Ile Glu Gly Gln
65                  70                  75                  80

Ala Ile Val Tyr Gln Ser Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr
                85                  90                  95

Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn
            100                 105                 110

Asn Glu Lys Tyr Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly
        115                 120                 125

Leu Gln Val Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala
    130                 135                 140

Ile Ile Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe
145                 150                 155                 160

Asp Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
                165                 170                 175
```

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Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val Phe
            180                 185                 190

Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Tyr Asn
        195                 200                 205

Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys Phe Leu Thr
    210                 215                 220

Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser Lys Ala Val Thr
225                 230                 235                 240

Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
                245                 250                 255

Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr
            260                 265                 270

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
        275                 280                 285

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Ile Ala Ser Thr Gly
    290                 295                 300

Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile
305                 310                 315                 320

Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala
                325                 330                 335

Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr
            340                 345                 350

Gln Asn Glu Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser
        355                 360                 365

Asp Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr
    370                 375                 380
```

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```
Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile
385                 390                 395                 400

Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
                405                 410                 415

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn Glu
            420                 425                 430

Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr
        435                 440                 445

Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln Ala Ile
    450                 455                 460

Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe
465                 470                 475                 480

Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Gly Lys
                485                 490                 495

Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln
            500                 505                 510

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu Ala
        515                 520                 525

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
    530                 535                 540

Asn Thr Phe Ile Ala Ser Thr Gly Tyr Thr Ser Ile Asn Gly Lys His
545                 550                 555                 560

Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly
                565                 570                 575

Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn
            580                 585                 590
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```
Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn
        595                 600                 605

Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu
    610                 615                 620

Arg Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val
625                 630                 635                 640

Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
                645                 650                 655

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys
            660                 665                 670

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys
        675                 680                 685

Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn
    690                 695                 700

Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu
705                 710                 715                 720

His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr Gly
                725                 730                 735

Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr Phe Glu Pro Asn Thr Ala
            740                 745                 750

Met Gly Ala Asn Gly Tyr Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe
        755                 760                 765

Arg Asn Gly Leu Pro Gln Ile Gly Val Phe Lys Gly Ser Asn Gly Phe
    770                 775                 780

Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln
785                 790                 795                 800
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Ala Ile Arg Tyr Gln Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr
805 810 815

Tyr Phe Gly Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn
820 825 830

Gly Lys Val Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly
835 840 845

Gly Leu Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly
850 855 860

Val Lys Ala Pro Gly Ile Tyr Gly
865 870

<210> 235
<211> 743
<212> PRT
<213> Clostridium difficile

<400> 235

Ala Val Gly Leu Gln Val Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro
1 5 10 15

Asp Thr Ala Ile Ile Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg
20 25 30

Tyr Tyr Phe Asp Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr
35 40 45

Ile Asp Gly Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile
50 55 60

Gly Val Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
65 70 75 80

Thr Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
85 90 95

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser Lys

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```
            100                 105                 110

Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr Phe Asn
        115                 120                 125

Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys
    130                 135                 140

Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln
145                 150                 155                 160

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Ile Ala
                165                 170                 175

Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr Phe Asn Thr
            180                 185                 190

Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
        195                 200                 205

Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala
    210                 215                 220

Ile Leu Tyr Gln Asn Glu Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr
225                 230                 235                 240

Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn
                245                 250                 255

Lys Lys Tyr Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu
            260                 265                 270

Cys Thr Ile Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu
        275                 280                 285

Gln Asn Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala
    290                 295                 300

Asn Asn Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly
```

305 310 315 320

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
325 330 335

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
340 345 350

Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln Thr Ile
355 360 365

Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu Ala Ala Thr
370 375 380

Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr
385 390 395 400

Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr
405 410 415

Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr Gly Tyr Thr Ser Ile Asn
420 425 430

Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
435 440 445

Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr His
450 455 460

Asn Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu
465 470 475 480

Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val
485 490 495

Thr Gly Leu Arg Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn
500 505 510

Thr Ala Val Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr

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515 520 525

Tyr Phe Asn Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile
530 535 540

Ser Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly
545 550 555 560

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
565 570 575

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe
580 585 590

Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala
595 600 605

Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr Phe Glu Pro
610 615 620

Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile Asp Asn Lys Asn
625 630 635 640

Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly Val Phe Lys Gly Ser
645 650 655

Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile
660 665 670

Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu His Leu Leu Gly
675 680 685

Lys Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Val Thr Gly Trp Gln
690 695 700

Thr Ile Asn Gly Lys Val Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala
705 710 715 720

Ala Ala Gly Gly Leu Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly

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725 730 735

Val Asp Gly Val Lys Ala Pro
740

<210> 236
<211> 816
<212> PRT
<213> Clostridium difficile

<400> 236

Met Gln Leu Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala
1 5 10 15

Pro Ala Asn Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr
20 25 30

Gln Ser Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn
35 40 45

Asp Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
50 55 60

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val Ile
65 70 75 80

Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile Ser Lys
85 90 95

Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp Thr Asp Thr
100 105 110

Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly Lys His Phe Tyr
115 120 125

Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val Phe Ser Thr Ser Asn
130 135 140

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Tyr Asn Asn Asn Ile Glu
145 150 155 160

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Gly Gln Ala Ile Val Tyr Gln Ser Lys Phe Leu Thr Leu Asn Gly Lys
165 170 175

Lys Tyr Tyr Phe Asp Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr
180 185 190

Ile Asp Ser Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
195 200 205

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn
210 215 220

Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr
225 230 235 240

Tyr Phe Asn Thr Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile
245 250 255

Asn Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly
260 265 270

Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
275 280 285

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe
290 295 300

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala
305 310 315 320

Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe Asn Pro
325 330 335

Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn Asn Asp Lys
340 345 350

Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly Tyr Ile Thr Ile
355 360 365

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```
Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn Glu Ser Lys Met Val
    370                 375                 380

Thr Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala
385                 390                 395                 400

Asn Thr His Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Asn
                405                 410                 415

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp Ser
            420                 425                 430

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
        435                 440                 445

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly
    450                 455                 460

Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp
465                 470                 475                 480

Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile
                485                 490                 495

Ala Ser Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn
            500                 505                 510

Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe
        515                 520                 525

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
    530                 535                 540

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr
545                 550                 555                 560

Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile Asp
                565                 570                 575
```

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```
Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr Gly
            580                 585                 590

Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ser
        595                 600                 605

Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys His Phe Tyr Phe
    610                 615                 620

Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly
625                 630                 635                 640

Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly
                645                 650                 655

Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn Ile
            660                 665                 670

Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr Ile
        675                 680                 685

Asp Gly Asn Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn
    690                 695                 700

Gly Tyr Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu
705                 710                 715                 720

Pro Gln Ile Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala
                725                 730                 735

Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr
            740                 745                 750

Gln Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
        755                 760                 765

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
    770                 775                 780
```

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Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Gly Gly Leu Phe Glu
785 790 795 800

Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala Pro
805 810 815

<210> 237
<211> 767
<212> PRT
<213> Clostridium difficile

<400> 237

Met Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg
1 5 10 15

Phe Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
20 25 30

Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
35 40 45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
50 55 60

Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65 70 75 80

Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys
85 90 95

Asn Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
100 105 110

Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
115 120 125

Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
130 135 140

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```
Val Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145                 150                 155                 160

Leu Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met
                165                 170                 175

Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala
            180                 185                 190

Gln Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr
        195                 200                 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr
    210                 215                 220

Ile Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val
225                 230                 235                 240

Arg Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu
                245                 250                 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu
            260                 265                 270

Arg Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp
        275                 280                 285

Met Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro
    290                 295                 300

Ser Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile
305                 310                 315                 320

Met Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp
                325                 330                 335

Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
            340                 345                 350
```

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2013333532


```
Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala
        355                 360                 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn
    370                 375                 380

Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val
385                 390                 395                 400

Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro
                405                 410                 415

Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile
            420                 425                 430

Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met
        435                 440                 445

Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr
    450                 455                 460

Thr Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp
465                 470                 475                 480

Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala
                485                 490                 495

Asp Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr
            500                 505                 510

Glu Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys
        515                 520                 525

Ala Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly
    530                 535                 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu
545                 550                 555                 560
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2013333532


```
Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly
                565                 570                 575

Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
            580                 585                 590

Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe
        595                 600                 605

Gln Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly
    610                 615                 620

Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile
625                 630                 635                 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp
                645                 650                 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser
            660                 665                 670

Thr Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro
        675                 680                 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser
    690                 695                 700

Ile Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys
705                 710                 715                 720

Asp Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
                725                 730                 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg
            740                 745                 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser
        755                 760                 765
```

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<210> 238
<211> 543
<212> PRT
<213> Clostridium difficile

<400> 238

```
Met Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg
1               5                  10                  15

Phe Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
            20                  25                  30

Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
        35                  40                  45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
    50                  55                  60

Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65                  70                  75                  80

Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys
                85                  90                  95

Asn Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
            100                 105                 110

Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
        115                 120                 125

Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
    130                 135                 140

Val Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145                 150                 155                 160

Leu Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met
                165                 170                 175
```

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```
Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala
            180                 185                 190

Gln Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr
        195                 200                 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr
    210                 215                 220

Ile Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val
225                 230                 235                 240

Arg Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu
                245                 250                 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu
            260                 265                 270

Arg Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp
        275                 280                 285

Met Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro
    290                 295                 300

Ser Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile
305                 310                 315                 320

Met Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp
                325                 330                 335

Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
            340                 345                 350

Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala
        355                 360                 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn
    370                 375                 380
```

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Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val
385 390 395 400

Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro
405 410 415

Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile
420 425 430

Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met
435 440 445

Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr
450 455 460

Thr Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp
465 470 475 480

Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala
485 490 495

Asp Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr
500 505 510

Glu Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys
515 520 525

Ala Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 239
<211> 224
<212> PRT
<213> Clostridium difficile

<400> 239

Gly Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys
1 5 10 15

Glu Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg

20 25 30

Gly Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr
35 40 45

Glu Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu
50 55 60

Phe Gln Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro
65 70 75 80

Gly Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile
85 90 95

Ile Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys
100 105 110

Asp Glu Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu
115 120 125

Ser Thr Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser
130 135 140

Pro Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr
145 150 155 160

Ser Ile Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val
165 170 175

Lys Asp Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile
180 185 190

Ile Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
195 200 205

Arg Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser
210 215 220

<210> 240

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<211> 1066
<212> PRT
<213> Clostridium difficile

<400> 240

```
Ile Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys
1               5                  10                  15

Glu Asn Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr
            20                  25                  30

Leu Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu
        35                  40                  45

Glu Glu Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn
    50                  55                  60

Ile Asp Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu
65                  70                  75                  80

Thr Ser Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu
                85                  90                  95

Ser Ile Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu
            100                 105                 110

Asp Ser His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly
        115                 120                 125

Phe Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val
    130                 135                 140

Glu Thr Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu
145                 150                 155                 160

Glu Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys
                165                 170                 175

Leu Val Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu
            180                 185                 190
```

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```
Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys
        195                 200                 205

Glu Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala
    210                 215                 220

Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp Ala Ala Lys Val
225                 230                 235                 240

Val Glu Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu Pro
                245                 250                 255

Thr Leu Ser Glu Gly Leu Pro Ile Ile Ala Thr Ile Ile Asp Gly Val
            260                 265                 270

Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp Pro Leu
        275                 280                 285

Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala Val Asn Leu
    290                 295                 300

Thr Thr Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu Gly Ile Ala Ser
305                 310                 315                 320

Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile Ser Ala Gly Ile
                325                 330                 335

Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg Asp Lys Ala Thr Lys
            340                 345                 350

Val Val Asp Tyr Phe Lys His Val Ser Leu Val Glu Thr Glu Gly Val
        355                 360                 365

Phe Thr Leu Leu Asp Asp Lys Ile Met Met Pro Gln Asp Asp Leu Val
    370                 375                 380

Ile Ser Glu Ile Asp Phe Asn Asn Asn Ser Ile Val Leu Gly Lys Cys
385                 390                 395                 400
```

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Glu Ile Trp Arg Met Glu Gly Gly Ser Gly His Thr Val Thr Asp Asp
405 410 415

Ile Asp His Phe Phe Ser Ala Pro Ser Ile Thr Tyr Arg Glu Pro His
420 425 430

Leu Ser Ile Tyr Asp Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu
435 440 445

Ser Lys Asp Leu Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala
450 455 460

Trp Glu Thr Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly
465 470 475 480

Thr Lys Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr
485 490 495

Trp Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
500 505 510

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn Thr
515 520 525

Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile Arg Glu Lys
530 535 540

Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala Leu Ser Leu
545 550 555 560

Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser Glu Ser Asp Val
565 570 575

Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp Val Thr Ile Glu Ser
580 585 590

Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu Gly Ile Leu Ser Thr Leu
595 600 605

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```
Ser Ile Glu Glu Asn Lys Ile Ile Leu Asn Ser His Glu Ile Asn Phe
    610                 615                 620

Ser Gly Glu Val Asn Gly Ser Asn Gly Phe Val Ser Leu Thr Phe Ser
625                 630                 635                 640

Ile Leu Glu Gly Ile Asn Ala Ile Ile Glu Val Asp Leu Leu Ser Lys
                645                 650                 655

Ser Tyr Lys Leu Leu Ile Ser Gly Glu Leu Lys Ile Leu Met Leu Asn
            660                 665                 670

Ser Asn His Ile Gln Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu
        675                 680                 685

Leu Gln Lys Asn Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu
    690                 695                 700

Asn Gly Phe Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu
705                 710                 715                 720

Leu Pro Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys
                725                 730                 735

Pro Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
            740                 745                 750

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp Asp
        755                 760                 765

Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys Thr Ile Lys
    770                 775                 780

Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala Glu Ile Leu Lys
785                 790                 795                 800

Phe Met Asn Arg Lys Gly Asn Thr Asn Thr Ser Asp Ser Leu Met Ser
                805                 810                 815
```

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```
Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe Val Asn Phe Leu Gln
            820                 825                 830

Ser Asn Ile Lys Phe Ile Leu Asp Ala Asn Phe Ile Ile Ser Gly Thr
        835                 840                 845

Thr Ser Ile Gly Gln Phe Glu Phe Ile Cys Asp Glu Asn Asp Asn Ile
    850                 855                 860

Gln Pro Tyr Phe Ile Lys Phe Asn Thr Leu Glu Thr Asn Tyr Thr Leu
865                 870                 875                 880

Tyr Val Gly Asn Arg Gln Asn Met Ile Val Glu Pro Asn Tyr Asp Leu
                885                 890                 895

Asp Asp Ser Gly Asp Ile Ser Ser Thr Val Ile Asn Phe Ser Gln Lys
            900                 905                 910

Tyr Leu Tyr Gly Ile Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro
        915                 920                 925

Asn Ile Tyr Thr Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn
    930                 935                 940

Asn Thr Tyr Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu
945                 950                 955                 960

Lys Ile Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser
                965                 970                 975

Asn Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
            980                 985                 990

Val Ser Gln Val Lys Ile Arg Phe  Val Asn Val Phe Lys  Asp Lys Thr
        995                 1000                1005

Leu Ala  Asn Lys Leu Ser Phe  Asn Phe Ser Asp Lys  Gln Asp Val
    1010                1015                1020
```

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Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr Tyr Glu
1025 1030 1035

Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr Asn
1040 1045 1050

Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser
1055 1060 1065

<210> 241
<211> 514
<212> PRT
<213> Clostridium difficile

<400> 241

Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr Tyr Phe Asn Pro
1 5 10 15

Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr Ile Ile Asp Asp Lys
20 25 30

Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu Gln Thr Gly Val Phe Ser
35 40 45

Thr Glu Asp Gly Phe Lys Tyr Phe Ala Pro Ala Asn Thr Leu Asp Glu
50 55 60

Asn Leu Glu Gly Glu Ala Ile Asp Phe Thr Gly Lys Leu Ile Ile Asp
65 70 75 80

Glu Asn Ile Tyr Tyr Phe Asp Asp Asn Tyr Arg Gly Ala Val Glu Trp
85 90 95

Lys Glu Leu Asp Gly Glu Met His Tyr Phe Ser Pro Glu Thr Gly Lys
100 105 110

Ala Phe Lys Gly Leu Asn Gln Ile Gly Asp Tyr Lys Tyr Tyr Phe Asn
115 120 125

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```
Ser Asp Gly Val Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys
    130                 135                 140

His Tyr Phe Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile
145                 150                 155                 160

Asp Gly Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly
                165                 170                 175

Val Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
            180                 185                 190

Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile Leu
        195                 200                 205

Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr Ala Val
    210                 215                 220

Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr Phe Asp Glu
225                 230                 235                 240

Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile Asn Asp Gly Gln
                245                 250                 255

Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val Gly Phe Val Thr Ile
            260                 265                 270

Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser Gly Ile Ile Glu Ser Gly
        275                 280                 285

Val Gln Asn Ile Asp Asp Asn Tyr Phe Tyr Ile Asp Asp Asn Gly Ile
    290                 295                 300

Val Gln Ile Gly Val Phe Asp Thr Ser Asp Gly Tyr Lys Tyr Phe Ala
305                 310                 315                 320

Pro Ala Asn Thr Val Asn Asp Asn Ile Tyr Gly Gln Ala Val Glu Tyr
                325                 330                 335
```

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Ser Gly Leu Val Arg Val Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr
340 345 350

Tyr Thr Ile Glu Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp
355 360 365

Lys Tyr Tyr Phe Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn
370 375 380

Leu Ile Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg
385 390 395 400

Thr Gly Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn
405 410 415

Gly Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
420 425 430

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro Asp
435 440 445

Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn Phe Glu
450 455 460

Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp Glu Lys Arg
465 470 475 480

Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly Ser Val Ile Ile
485 490 495

Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr Ala Gln Leu Val Ile
500 505 510

Ser Glu

<210> 242
<211> 210
<212> PRT

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<213> Clostridium difficile

<400> 242

```
Val Gln Ile Gly Val Phe Asp Thr Ser Asp Gly Tyr Lys Tyr Phe Ala
1               5                  10                  15

Pro Ala Asn Thr Val Asn Asp Asn Ile Tyr Gly Gln Ala Val Glu Tyr
            20                  25                  30

Ser Gly Leu Val Arg Val Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr
        35                  40                  45

Tyr Thr Ile Glu Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp
    50                  55                  60

Lys Tyr Tyr Phe Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn
65                  70                  75                  80

Leu Ile Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg
                85                  90                  95

Thr Gly Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn
            100                 105                 110

Gly Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
        115                 120                 125

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro Asp
    130                 135                 140

Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn Phe Glu
145                 150                 155                 160

Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp Glu Lys Arg
                165                 170                 175

Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly Ser Val Ile Ile
            180                 185                 190
```

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Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr Ala Gln Leu Val Ile
195 200 205

Ser Glu
210

<210> 243
<211> 311
<212> PRT
<213> Clostridium difficile

<400> 243

Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp
1 5 10 15

Ser Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys
20 25 30

Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu
35 40 45

Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
50 55 60

Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser Gly
65 70 75 80

Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe Tyr Ile
85 90 95

Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr Ser Asp Gly
100 105 110

Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn Ile Tyr Gly
115 120 125

Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val Gly Glu Asp Val Tyr
130 135 140

Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile Tyr Asp Met

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145 150 155 160

Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asn Pro Glu Thr Lys Lys Ala
165 170 175

Cys Lys Gly Ile Asn Leu Ile Asp Asp Ile Lys Tyr Tyr Phe Asp Glu
180 185 190

Lys Gly Ile Met Arg Thr Gly Leu Ile Ser Phe Glu Asn Asn Asn Tyr
195 200 205

Tyr Phe Asn Glu Asn Gly Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu
210 215 220

Asp Lys Met Phe Tyr Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val
225 230 235 240

Phe Asn Thr Pro Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu
245 250 255

Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp
260 265 270

Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr
275 280 285

Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
290 295 300

Ala Gln Leu Val Ile Ser Glu
305 310

<210> 244
<211> 768
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 244

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```
Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1               5                  10                  15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
            20                  25                  30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205
```

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```
Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Ala Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415
```

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```
Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
    530                 535                 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545                 550                 555                 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
        595                 600                 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
    610                 615                 620
```

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Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625 630 635 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
645 650 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
660 665 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
675 680 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr
690 695 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705 710 715 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
725 730 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
740 745 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
755 760 765

<210> 245
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 245

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr

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20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
130 135 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145 150 155 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
165 170 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
180 185 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
195 200 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
210 215 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala

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225 230 235 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Ala Leu Ala Val Ala Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile

435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 246
<211> 766
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 246

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

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```
Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Ala Ile Leu Ala
            260                 265                 270
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```
Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Ala Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480
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```
Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545                 550                 555                 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asn Lys Ile Ser Tyr Glu Ala
            580                 585                 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
        595                 600                 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
    610                 615                 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625                 630                 635                 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly Ala Gly Lys Asp Glu
                645                 650                 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
            660                 665                 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
        675                 680                 685
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Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
690 695 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705 710 715 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
725 730 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
740 745 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser
755 760 765

<210> 247
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 247

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn

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                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Ala Ile Leu Ala
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Ala Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
```

290 295 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu

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500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 248
<211> 228
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 248

Leu Ser Glu Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp
1 5 10 15

Lys Asn Tyr Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu
20 25 30

Ala Gly Ser Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asn
35 40 45

Asp Ile Ser Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys
50 55 60

Asn Ser Ile Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr
65 70 75 80

Phe Leu Ser Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg
85 90 95

Ile Pro Glu Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile
100 105 110

Gly Ala Gly Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser
115 120 125

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Val Asp Ser Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys
130 135 140

Leu Asp Ile Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn
145 150 155 160

Met Phe Ser Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu
165 170 175

Leu Leu Ser Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn
180 185 190

Lys Asn Ser Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn
195 200 205

Ser Glu Gly Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn
210 215 220

Lys Glu Glu Ala
225

<210> 249
<211> 224
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 249

Gly Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys
1 5 10 15

Glu Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg
20 25 30

Gly Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asn Lys Ile Ser Tyr
35 40 45

Glu Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu

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50 55 60

Phe Gln Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro
65 70 75 80

Gly Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile
85 90 95

Ile Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly Ala Gly Lys
100 105 110

Asp Glu Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu
115 120 125

Ser Thr Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser
130 135 140

Pro Lys Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
145 150 155 160

Ser Ile Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val
165 170 175

Lys Asp Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile
180 185 190

Ile Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
195 200 205

Arg Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser
210 215 220

<210> 250
<211> 322
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 250

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Ala Ser Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn
1               5                  10                  15

Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe
            20                  25                  30

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
        35                  40                  45

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr
    50                  55                  60

Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile Asp
65                  70                  75                  80

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr Gly
                85                  90                  95

Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ser
            100                 105                 110

Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys His Phe Tyr Phe
        115                 120                 125

Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly
    130                 135                 140

Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly
145                 150                 155                 160

Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn Ile
                165                 170                 175

Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr Ile
            180                 185                 190

Asp Gly Asn Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn
        195                 200                 205
```

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Gly Tyr Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu
210 215 220

Pro Gln Ile Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala
225 230 235 240

Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr
245 250 255

Gln Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
260 265 270

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
275 280 285

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe Glu
290 295 300

Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala Pro
305 310 315 320

Leu Glu

<210> 251
<211> 320
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 251

Ala Ser Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn
1 5 10 15

Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe
20 25 30

Glu Tyr Phe Ala Pro Ala Asn Thr Asp Asn Asn Asn Ile Glu Gly Gln

```
        35                  40                  45

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr
    50                  55                  60

Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile Asp
65                  70                  75                  80

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr Gly
                85                  90                  95

Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ser
            100                 105                 110

Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys His Phe Tyr Phe
        115                 120                 125

Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly
    130                 135                 140

Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly
145                 150                 155                 160

Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn Ile
                165                 170                 175

Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr Ile
            180                 185                 190

Asp Gly Asn Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn
        195                 200                 205

Gly Tyr Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu
    210                 215                 220

Pro Gln Ile Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala
225                 230                 235                 240

Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr
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245 250 255

Gln Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
260 265 270

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
275 280 285

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe Glu
290 295 300

Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala Pro
305 310 315 320

<210> 252
<211> 320
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 252

Ala Ser Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn
1 5 10 15

Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe
20 25 30

Glu Tyr Phe Ala Pro Ala Asn Thr His Ala Asn Asn Ile Glu Gly Gln
35 40 45

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr
50 55 60

Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile Asp
65 70 75 80

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr Gly
85 90 95

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```
Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ser
            100                 105                 110

Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys His Phe Tyr Phe
        115                 120                 125

Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly
    130                 135                 140

Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly
145                 150                 155                 160

Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn Ile
                165                 170                 175

Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr Ile
            180                 185                 190

Asp Gly Asn Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn
        195                 200                 205

Gly Tyr Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu
    210                 215                 220

Pro Gln Ile Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala
225                 230                 235                 240

Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr
                245                 250                 255

Gln Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
            260                 265                 270

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
        275                 280                 285

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe Glu
    290                 295                 300
```

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Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala Pro
305 310 315 320

<210> 253
<211> 320
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 253

Ala Ser Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn
1 5 10 15

Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe
20 25 30

Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln
35 40 45

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr
50 55 60

Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile Asp
65 70 75 80

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr Gly
85 90 95

Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ser
100 105 110

Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys His Phe Tyr Phe
115 120 125

Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly
130 135 140

Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly

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145 150 155 160

Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn Ile
165 170 175

Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr Ile
180 185 190

Asp Gly Asn Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn
195 200 205

Gly Tyr Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu
210 215 220

Pro Gln Ile Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala
225 230 235 240

Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr
245 250 255

Gln Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
260 265 270

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
275 280 285

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe Glu
290 295 300

Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala Pro
305 310 315 320

<210> 254
<211> 872
<212> PRT
<213> Clostridium difficile

<400> 254

His Met Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val
1 5 10 15

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```
Arg Phe Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu
            20                  25                  30

Glu Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu
        35                  40                  45

Lys Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr
    50                  55                  60

Lys Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu
65                  70                  75                  80

Val Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu
                85                  90                  95

Lys Asn Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala
            100                 105                 110

Ile Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val
        115                 120                 125

Asn Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys
    130                 135                 140

Thr Val Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu
145                 150                 155                 160

Asn Leu Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg
                165                 170                 175

Met Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys
            180                 185                 190

Ala Gln Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys
        195                 200                 205

Thr Tyr Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr
    210                 215                 220
```

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```
Tyr Ile Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp
225                 230                 235                 240

Val Arg Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr
                245                 250                 255

Glu Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Ala Ile
            260                 265                 270

Leu Ala Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Ala Leu Ala Val
        275                 280                 285

Ala Met Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys
    290                 295                 300

Pro Ser Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala
305                 310                 315                 320

Ile Met Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe
                325                 330                 335

Asp Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala
            340                 345                 350

Ser Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu
        355                 360                 365

Ala Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile
    370                 375                 380

Asn Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile
385                 390                 395                 400

Val Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn
                405                 410                 415

Pro Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe
            420                 425                 430
```

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Ile Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met
435 440 445

Met Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys
450 455 460

Thr Thr Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln
465 470 475 480

Asp Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu
485 490 495

Ala Asp Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser
500 505 510

Thr Glu Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala
515 520 525

Lys Ala Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

Gly Ser Gly Gly Gly Gly Ala Ser Thr Gly Tyr Thr Ser Ile Asn Gly
545 550 555 560

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
565 570 575

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn
580 585 590

Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr
595 600 605

Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr
610 615 620

Gly Leu Arg Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
625 630 635 640

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Ala Val Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr
645 650 655

Phe Asn Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser
660 665 670

Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
675 680 685

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
690 695 700

Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu
705 710 715 720

Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala
725 730 735

Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr Phe Glu Pro Asn
740 745 750

Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile Asp Asn Lys Asn Phe
755 760 765

Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly Val Phe Lys Gly Ser Asn
770 775 780

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu
785 790 795 800

Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu His Leu Leu Gly Lys
805 810 815

Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr
820 825 830

Ile Asn Gly Lys Val Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala
835 840 845

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Ala Gly Gly Leu Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val
850 855 860

Asp Gly Val Lys Ala Pro Leu Glu
865 870

<210> 255
<211> 206
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 255

Arg Tyr Tyr Phe Asp Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys
1 5 10 15

Thr Ile Asp Gly Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys
20 25 30

Ile Gly Val Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala
35 40 45

Asn Thr Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
50 55 60

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
65 70 75 80

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr Phe
85 90 95

Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly
100 105 110

Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp
115 120 125

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```
Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Ile
    130                 135                 140

Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr Phe Asn
145                 150                 155                 160

Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe
                165                 170                 175

Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln
            180                 185                 190

Ala Ile Leu Tyr Gln Asn Glu Phe Leu Thr Leu Asn Leu Glu
        195                 200                 205


<210>  256
<211>  865
<212>  PRT
<213>  Artificial Sequence

<220>
<223>  Synthetic amino acid sequence

<400>  256

Asp Pro Ile Glu Phe Asn Leu Val Thr Gly Trp Gln Thr Ile Asn Gly
1               5                   10                  15

Lys Lys Tyr Tyr Phe Asp Ile Asn Thr Gly Ala Ala Leu Ile Ser Tyr
            20                  25                  30

Lys Ile Ile Asn Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met
        35                  40                  45

Gln Leu Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro
    50                  55                  60

Ala Asn Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln
65                  70                  75                  80

Ser Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
                85                  90                  95
```

```
Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr Tyr
            100                 105                 110

Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val Ile Asp
        115                 120                 125

Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile Ser Lys Gly
    130                 135                 140

Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp Thr Asp Thr Ala
145                 150                 155                 160

Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly Lys His Phe Tyr Phe
                165                 170                 175

Asp Ser Asp Cys Val Val Lys Ile Gly Val Phe Ser Thr Ser Asn Gly
            180                 185                 190

Phe Glu Tyr Phe Ala Pro Ala Asn Thr Tyr Asn Asn Asn Ile Glu Gly
        195                 200                 205

Gln Ala Ile Val Tyr Gln Ser Lys Phe Leu Thr Leu Asn Gly Lys Lys
    210                 215                 220

Tyr Tyr Phe Asp Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile
225                 230                 235                 240

Asp Ser Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr
                245                 250                 255

Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
            260                 265                 270

Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr
        275                 280                 285

Phe Asn Thr Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn
    290                 295                 300
```

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```
Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
305                 310                 315                 320

Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
                325                 330                 335

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe Leu
            340                 345                 350

Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val
        355                 360                 365

Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe Asn Pro Asn
    370                 375                 380

Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn Asn Asp Lys Tyr
385                 390                 395                 400

Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly Tyr Ile Thr Ile Glu
                405                 410                 415

Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn Glu Ser Lys Met Val Thr
            420                 425                 430

Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
        435                 440                 445

Thr His Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Asn Lys
    450                 455                 460

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys
465                 470                 475                 480

Ala Val Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
                485                 490                 495

Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys
            500                 505                 510
```

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Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln
515 520 525

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala
530 535 540

Ser Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr
545 550 555 560

Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
565 570 575

Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln Ala
580 585 590

Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr
595 600 605

Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile Asp Gly
610 615 620

Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr Gly Trp
625 630 635 640

Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ser Ile
645 650 655

Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys His Phe Tyr Phe Asn
660 665 670

Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly Phe
675 680 685

Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln
690 695 700

Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr
705 710 715 720

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Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp
725 730 735

Gly Asn Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly
740 745 750

Tyr Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro
755 760 765

Gln Ile Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro
770 775 780

Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln
785 790 795 800

Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
805 810 815

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr Tyr
820 825 830

Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe Glu Ile
835 840 845

Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala Pro Leu
850 855 860

Glu
865

<210> 257
<211> 459
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 257

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```
Ile Leu Gln Asn Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe
1               5                  10                  15

Asp Ala Asn Asn Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro
            20                  25                  30

Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile
        35                  40                  45

Glu Gly Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly
    50                  55                  60

Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
65                  70                  75                  80

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu Ala
                85                  90                  95

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu
            100                 105                 110

Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys
        115                 120                 125

Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr Gly Tyr Thr Ser
    130                 135                 140

Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile
145                 150                 155                 160

Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
                165                 170                 175

Thr His Asn Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Lys
            180                 185                 190

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
        195                 200                 205
```

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```
Ala Val Thr Gly Leu Arg Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
    210                 215                 220

Thr Asn Thr Ala Val Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys
225                 230                 235                 240

Lys Tyr Tyr Phe Asn Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr
                245                 250                 255

Ile Ile Ser Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln
            260                 265                 270

Ile Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala
        275                 280                 285

Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
    290                 295                 300

Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
305                 310                 315                 320

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr Phe
                325                 330                 335

Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile Asp Asn
            340                 345                 350

Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly Val Phe Lys
        355                 360                 365

Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn
    370                 375                 380

Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu His Leu
385                 390                 395                 400

Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Val Thr Gly
                405                 410                 415
```

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Trp Gln Thr Ile Asn Gly Lys Val Tyr Tyr Phe Met Pro Asp Thr Ala
420 425 430

Met Ala Ala Ala Gly Gly Leu Phe Glu Ile Asp Gly Val Ile Tyr Phe
435 440 445

Phe Gly Val Asp Gly Val Lys Ala Pro Leu Glu
450 455

<210> 258
<211> 888
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 258

Gly Ser Ser His His His His His His Glu Asn Leu Tyr Phe Gln Gly
1 5 10 15

Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn Leu Val Thr Gly Trp
20 25 30

Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asp Ile Asn Thr Gly Ala
35 40 45

Ala Leu Ile Ser Tyr Lys Ile Ile Asn Gly Lys His Phe Tyr Phe Asn
50 55 60

Asn Asp Gly Val Met Gln Leu Gly Val Phe Lys Gly Pro Asp Gly Phe
65 70 75 80

Glu Tyr Phe Ala Pro Ala Asn Thr Gln Asn Asn Asn Ile Glu Gly Gln
85 90 95

Ala Ile Val Tyr Gln Ser Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr
100 105 110

Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn
115 120 125

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```
Asn Glu Lys Tyr Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly
    130                 135                 140

Leu Gln Val Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala
145                 150                 155                 160

Ile Ile Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe
                165                 170                 175

Asp Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
            180                 185                 190

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val Phe
        195                 200                 205

Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Tyr Asn
    210                 215                 220

Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys Phe Leu Thr
225                 230                 235                 240

Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser Lys Ala Val Thr
                245                 250                 255

Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
            260                 265                 270

Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr
        275                 280                 285

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
    290                 295                 300

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Ile Ala Ser Thr Gly
305                 310                 315                 320

Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile
                325                 330                 335
```

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```
Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala
            340                 345                 350

Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr
        355                 360                 365

Gln Asn Glu Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser
    370                 375                 380

Asp Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr
385                 390                 395                 400

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile
                405                 410                 415

Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
            420                 425                 430

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn Glu
        435                 440                 445

Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr
    450                 455                 460

Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln Ala Ile
465                 470                 475                 480

Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe
                485                 490                 495

Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Gly Lys
            500                 505                 510

Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln
        515                 520                 525

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu Ala
    530                 535                 540
```

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```
Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
545                 550                 555                 560

Asn Thr Phe Ile Ala Ser Thr Gly Tyr Thr Ser Ile Asn Gly Lys His
                565                 570                 575

Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly
            580                 585                 590

Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn
        595                 600                 605

Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn
    610                 615                 620

Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu
625                 630                 635                 640

Arg Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val
                645                 650                 655

Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
            660                 665                 670

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys
        675                 680                 685

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys
    690                 695                 700

Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn
705                 710                 715                 720

Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu
                725                 730                 735

His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr Gly
            740                 745                 750
```

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Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr Phe Glu Pro Asn Thr Ala
755 760 765

Met Gly Ala Asn Gly Tyr Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe
770 775 780

Arg Asn Gly Leu Pro Gln Ile Gly Val Phe Lys Gly Ser Asn Gly Phe
785 790 795 800

Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln
805 810 815

Ala Ile Arg Tyr Gln Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr
820 825 830

Tyr Phe Gly Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn
835 840 845

Gly Lys Val Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly
850 855 860

Gly Leu Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly
865 870 875 880

Val Lys Ala Pro Gly Ile Tyr Gly
885

<210> 259
<211> 832
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 259

Gly Ser Ser His His His His His His Glu Asn Leu Tyr Phe Gln Gly
1 5 10 15

```
Met Gln Leu Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala
            20                  25                  30

Pro Ala Asn Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr
        35                  40                  45

Gln Ser Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn
    50                  55                  60

Asp Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
65                  70                  75                  80

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val Ile
                85                  90                  95

Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile Ser Lys
            100                 105                 110

Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp Thr Asp Thr
        115                 120                 125

Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly Lys His Phe Tyr
    130                 135                 140

Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val Phe Ser Thr Ser Asn
145                 150                 155                 160

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Tyr Asn Asn Asn Ile Glu
                165                 170                 175

Gly Gln Ala Ile Val Tyr Gln Ser Lys Phe Leu Thr Leu Asn Gly Lys
            180                 185                 190

Lys Tyr Tyr Phe Asp Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr
        195                 200                 205

Ile Asp Ser Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
    210                 215                 220
```

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```
Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn
225                 230                 235                 240

Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr
                245                 250                 255

Tyr Phe Asn Thr Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile
            260                 265                 270

Asn Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly
        275                 280                 285

Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
    290                 295                 300

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe
305                 310                 315                 320

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala
                325                 330                 335

Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe Asn Pro
            340                 345                 350

Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn Asn Asp Lys
        355                 360                 365

Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly Tyr Ile Thr Ile
    370                 375                 380

Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn Glu Ser Lys Met Val
385                 390                 395                 400

Thr Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala
                405                 410                 415

Asn Thr His Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Asn
            420                 425                 430
```

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```
Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp Ser
        435                 440                 445

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
    450                 455                 460

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly
465                 470                 475                 480

Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp
                485                 490                 495

Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile
            500                 505                 510

Ala Ser Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn
        515                 520                 525

Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe
    530                 535                 540

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
545                 550                 555                 560

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr
                565                 570                 575

Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile Asp
            580                 585                 590

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr Gly
        595                 600                 605

Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ser
    610                 615                 620

Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys His Phe Tyr Phe
625                 630                 635                 640
```

```
Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly
                645                 650                 655

Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly
            660                 665                 670

Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn Ile
        675                 680                 685

Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr Ile
    690                 695                 700

Asp Gly Asn Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn
705                 710                 715                 720

Gly Tyr Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu
                725                 730                 735

Pro Gln Ile Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala
            740                 745                 750

Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr
        755                 760                 765

Gln Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
    770                 775                 780

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
785                 790                 795                 800

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe Glu
                805                 810                 815

Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala Pro
            820                 825                 830
```

<210> 260
<211> 759
<212> PRT
<213> Artificial Sequence

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2013333532

<220>
<223> Synthetic amino acid sequence

<400> 260

Gly Ser Ser His His His His His His Glu Asn Leu Tyr Phe Gln Gly
1 5 10 15

Ala Val Gly Leu Gln Val Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro
20 25 30

Asp Thr Ala Ile Ile Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg
35 40 45

Tyr Tyr Phe Asp Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr
50 55 60

Ile Asp Gly Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile
65 70 75 80

Gly Val Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
85 90 95

Thr Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
100 105 110

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser Lys
115 120 125

Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr Phe Asn
130 135 140

Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys
145 150 155 160

Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln
165 170 175

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Ile Ala
180 185 190

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```
Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr Phe Asn Thr
        195                 200                 205

Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
    210                 215                 220

Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala
225                 230                 235                 240

Ile Leu Tyr Gln Asn Glu Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr
                245                 250                 255

Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn
            260                 265                 270

Lys Lys Tyr Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu
        275                 280                 285

Cys Thr Ile Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu
    290                 295                 300

Gln Asn Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala
305                 310                 315                 320

Asn Asn Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly
                325                 330                 335

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
            340                 345                 350

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
        355                 360                 365

Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln Thr Ile
    370                 375                 380

Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu Ala Ala Thr
385                 390                 395                 400
```

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```
Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr
                405                 410                 415

Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr
            420                 425                 430

Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr Gly Tyr Thr Ser Ile Asn
        435                 440                 445

Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
    450                 455                 460

Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr His
465                 470                 475                 480

Asn Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu
                485                 490                 495

Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val
            500                 505                 510

Thr Gly Leu Arg Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn
        515                 520                 525

Thr Ala Val Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr
    530                 535                 540

Tyr Phe Asn Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile
545                 550                 555                 560

Ser Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly
                565                 570                 575

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
            580                 585                 590

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe
        595                 600                 605
```

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Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala
610 615 620

Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr Phe Glu Pro
625 630 635 640

Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile Asp Asn Lys Asn
645 650 655

Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly Val Phe Lys Gly Ser
660 665 670

Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile
675 680 685

Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu His Leu Leu Gly
690 695 700

Lys Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Val Thr Gly Trp Gln
705 710 715 720

Thr Ile Asn Gly Lys Val Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala
725 730 735

Ala Ala Gly Gly Leu Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly
740 745 750

Val Asp Gly Val Lys Ala Pro
755

<210> 261
<211> 419
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 261

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```
Gly Ser Ser His His His His His His Glu Asn Leu Tyr Phe Gln Gly
1               5                  10                  15

Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp
            20                  25                  30

Asn Asp Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys
        35                  40                  45

Tyr Tyr Phe Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr
    50                  55                  60

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu Ala Ala
65                  70                  75                  80

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn
                85                  90                  95

Thr Phe Ile Ala Ser Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe
            100                 105                 110

Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro
        115                 120                 125

Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile
    130                 135                 140

Glu Gly Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly
145                 150                 155                 160

Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg
                165                 170                 175

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
            180                 185                 190

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr
        195                 200                 205
```

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```
Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys His
    210                 215                 220

Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly
225                 230                 235                 240

Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn
                245                 250                 255

Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His
            260                 265                 270

Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr Gly Trp
        275                 280                 285

Val Thr Ile Asp Gly Asn Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Met
    290                 295                 300

Gly Ala Asn Gly Tyr Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe Arg
305                 310                 315                 320

Asn Gly Leu Pro Gln Ile Gly Val Phe Lys Gly Ser Asn Gly Phe Glu
                325                 330                 335

Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala
            340                 345                 350

Ile Arg Tyr Gln Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr
        355                 360                 365

Phe Gly Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly
    370                 375                 380

Lys Val Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly
385                 390                 395                 400

Leu Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
                405                 410                 415
```

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Lys Ala Pro

<210> 262
<211> 244
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 262

Gly Ser Ser His His His His His His Glu Asn Leu Tyr Phe Gln Gly
1 5 10 15

Leu Ser Glu Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp
20 25 30

Lys Asn Tyr Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu
35 40 45

Ala Gly Ser Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asn
50 55 60

Asp Ile Ser Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys
65 70 75 80

Asn Ser Ile Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr
85 90 95

Phe Leu Ser Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg
100 105 110

Ile Pro Glu Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile
115 120 125

Gly Ala Gly Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser
130 135 140

Val Asp Ser Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys
145 150 155 160

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Leu Asp Ile Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn
165 170 175

Met Phe Ser Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu
180 185 190

Leu Leu Ser Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn
195 200 205

Lys Asn Ser Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn
210 215 220

Ser Glu Gly Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn
225 230 235 240

Lys Glu Glu Ala

<210> 263
<211> 281
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 263

Gly Ser Ser His His His His His His Glu Asn Leu Tyr Phe Gln Gly
1 5 10 15

Glu Asp Ile Asn Val Phe Met Lys Asp Asp Ile Asn Thr Ile Thr Gly
20 25 30

Lys Tyr Tyr Val Asp Asn Asn Thr Asp Lys Ser Ile Asp Phe Ser Ile
35 40 45

Ser Leu Val Ser Lys Asn Gln Val Lys Val Asn Gly Leu Tyr Leu Asn
50 55 60

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```
Glu Ser Val Tyr Ser Ser Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly
65                  70                  75                  80

His His Asn Thr Ser Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser
                85                  90                  95

Phe Trp Lys Leu Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys
            100                 105                 110

Tyr Phe Thr Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile
        115                 120                 125

Cys Asp Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr
    130                 135                 140

Ser Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
145                 150                 155                 160

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr Ser
                165                 170                 175

Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr Ile Asn
            180                 185                 190

Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile Asn Ile Asn
        195                 200                 205

Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile Ile Val Leu Asn
    210                 215                 220

Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn Leu Asp Ser Ser Ser
225                 230                 235                 240

Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser Asp Phe Ile Leu Val Arg
                245                 250                 255

Tyr Leu Glu Glu Ser Asn Lys Lys Ile Leu Gln Lys Ile Arg Ile Lys
            260                 265                 270
```

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Gly Ile Leu Ser Asn Thr Gln Ser Phe
275 280

<210> 264
<211> 240
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 264

Gly Ser Ser His His His His His His Glu Asn Leu Tyr Phe Gln Gly
1 5 10 15

Gly Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys
20 25 30

Glu Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg
35 40 45

Gly Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asn Lys Ile Ser Tyr
50 55 60

Glu Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu
65 70 75 80

Phe Gln Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro
85 90 95

Gly Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile
100 105 110

Ile Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly Ala Gly Lys
115 120 125

Asp Glu Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu
130 135 140

Ser Thr Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser
145 150 155 160

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Pro Lys Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
165 170 175

Ser Ile Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val
180 185 190

Lys Asp Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile
195 200 205

Ile Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
210 215 220

Arg Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser
225 230 235 240

<210> 265
<211> 782
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 265

Gly Ser Ser His His His His His His Glu Asn Leu Tyr Phe Gln Gly
1 5 10 15

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
20 25 30

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
35 40 45

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
50 55 60

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
65 70 75 80

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2013333532


```
Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
                85                  90                  95

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
            100                 105                 110

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
        115                 120                 125

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
    130                 135                 140

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
145                 150                 155                 160

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
                165                 170                 175

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
            180                 185                 190

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
        195                 200                 205

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
    210                 215                 220

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
225                 230                 235                 240

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
                245                 250                 255

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
            260                 265                 270

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Ala Ile Leu Ala
        275                 280                 285
```

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```
Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Ala Leu Ala Val Ala Met
    290                 295                 300

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
305                 310                 315                 320

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
                325                 330                 335

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
            340                 345                 350

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
        355                 360                 365

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
    370                 375                 380

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
385                 390                 395                 400

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
                405                 410                 415

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
            420                 425                 430

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
        435                 440                 445

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
    450                 455                 460

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
465                 470                 475                 480

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
                485                 490                 495
```

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```
Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
            500                 505                 510

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
        515                 520                 525

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
    530                 535                 540

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
545                 550                 555                 560

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
                565                 570                 575

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
            580                 585                 590

Ile His Tyr Ile Val Gln Leu Gln Gly Asn Lys Ile Ser Tyr Glu Ala
        595                 600                 605

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
    610                 615                 620

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
625                 630                 635                 640

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
                645                 650                 655

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly Ala Gly Lys Asp Glu
            660                 665                 670

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
        675                 680                 685

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
    690                 695                 700
```

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Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
705 710 715 720

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
725 730 735

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
740 745 750

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
755 760 765

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser
770 775 780

<210> 266
<211> 558
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 266

Gly Ser Ser His His His His His His Glu Asn Leu Tyr Phe Gln Gly
1 5 10 15

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
20 25 30

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
35 40 45

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
50 55 60

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
65 70 75 80

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
85 90 95

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```
Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
            100                 105                 110

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
        115                 120                 125

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
    130                 135                 140

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
145                 150                 155                 160

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
                165                 170                 175

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
            180                 185                 190

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
        195                 200                 205

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
    210                 215                 220

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
225                 230                 235                 240

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
                245                 250                 255

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
            260                 265                 270

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Ala Ile Leu Ala
        275                 280                 285

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Ala Leu Ala Val Ala Met
    290                 295                 300
```

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```
Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
305                 310                 315                 320

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
                325                 330                 335

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
            340                 345                 350

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
        355                 360                 365

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
    370                 375                 380

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
385                 390                 395                 400

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
                405                 410                 415

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
            420                 425                 430

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
        435                 440                 445

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
    450                 455                 460

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
465                 470                 475                 480

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
                485                 490                 495

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
            500                 505                 510
```

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Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
515 520 525

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
530 535 540

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
545 550 555

<210> 267
<211> 532
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 267

Gly Ser Ser His His His His His His Glu Asn Leu Tyr Phe Gln Gly
1 5 10 15

Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr Tyr Phe Asn Pro
20 25 30

Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr Ile Ile Asp Asp Lys
35 40 45

Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu Gln Thr Gly Val Phe Ser
50 55 60

Thr Glu Asp Gly Phe Lys Tyr Phe Ala Pro Ala Asn Thr Leu Asp Glu
65 70 75 80

Asn Leu Glu Gly Glu Ala Ile Asp Phe Thr Gly Lys Leu Ile Ile Asp
85 90 95

Glu Asn Ile Tyr Tyr Phe Asp Asp Asn Tyr Arg Gly Ala Val Glu Trp
100 105 110

17 Jun 2019
2013333532

```
Lys Glu Leu Asp Gly Glu Met His Tyr Phe Ser Pro Glu Thr Gly Lys
        115                 120                 125

Ala Phe Lys Gly Leu Asn Gln Ile Gly Asp Tyr Lys Tyr Tyr Phe Asn
    130                 135                 140

Ser Asp Gly Val Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys
145                 150                 155                 160

His Tyr Phe Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile
                165                 170                 175

Asp Gly Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly
            180                 185                 190

Val Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
        195                 200                 205

Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile Leu
    210                 215                 220

Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr Ala Val
225                 230                 235                 240

Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr Phe Asp Glu
                245                 250                 255

Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile Asn Asp Gly Gln
            260                 265                 270

Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val Gly Phe Val Thr Ile
        275                 280                 285

Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser Gly Ile Ile Glu Ser Gly
    290                 295                 300

Val Gln Asn Ile Asp Asp Asn Tyr Phe Tyr Ile Asp Asp Asn Gly Ile
305                 310                 315                 320
```

```
Val Gln Ile Gly Val Phe Asp Thr Ser Asp Gly Tyr Lys Tyr Phe Ala
                325                 330                 335

Pro Ala Asn Thr Val Asn Asp Asn Ile Tyr Gly Gln Ala Val Glu Tyr
            340                 345                 350

Ser Gly Leu Val Arg Val Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr
        355                 360                 365

Tyr Thr Ile Glu Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp
    370                 375                 380

Lys Tyr Tyr Phe Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn
385                 390                 395                 400

Leu Ile Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg
                405                 410                 415

Thr Gly Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn
            420                 425                 430

Gly Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
        435                 440                 445

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro Asp
    450                 455                 460

Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn Phe Glu
465                 470                 475                 480

Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp Glu Lys Arg
                485                 490                 495

Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly Ser Val Ile Ile
            500                 505                 510

Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr Ala Gln Leu Val Ile
        515                 520                 525
```

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Ser Glu Leu Glu
530

<210> 268
<211> 228
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 268

Gly Ser Ser His His His His His His Glu Asn Leu Tyr Phe Gln Gly
1 5 10 15

Val Gln Ile Gly Val Phe Asp Thr Ser Asp Gly Tyr Lys Tyr Phe Ala
20 25 30

Pro Ala Asn Thr Val Asn Asp Asn Ile Tyr Gly Gln Ala Val Glu Tyr
35 40 45

Ser Gly Leu Val Arg Val Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr
50 55 60

Tyr Thr Ile Glu Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp
65 70 75 80

Lys Tyr Tyr Phe Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn
85 90 95

Leu Ile Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg
100 105 110

Thr Gly Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn
115 120 125

Gly Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
130 135 140

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro Asp
145 150 155 160

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Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn Phe Glu
165 170 175

Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp Glu Lys Arg
180 185 190

Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly Ser Val Ile Ile
195 200 205

Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr Ala Gln Leu Val Ile
210 215 220

Ser Glu Leu Glu
225

<210> 269
<211> 304
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 269

Gly Ser Ser His His His His His His Glu Asn Leu Tyr Phe Gln Gly
1 5 10 15

Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp
20 25 30

Ser Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys
35 40 45

Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu
50 55 60

Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
65 70 75 80

```
Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser Gly
                85                  90                  95

Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe Tyr Ile
            100                 105                 110

Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr Ser Asp Gly
        115                 120                 125

Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn Ile Tyr Gly
    130                 135                 140

Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val Gly Glu Asp Val Tyr
145                 150                 155                 160

Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile Tyr Asp Met
                165                 170                 175

Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asn Pro Glu Thr Lys Lys Ala
            180                 185                 190

Cys Lys Gly Ile Asn Leu Ile Asp Asp Ile Lys Tyr Tyr Phe Asp Glu
        195                 200                 205

Lys Gly Ile Met Arg Thr Gly Leu Ile Ser Phe Glu Asn Asn Asn Tyr
    210                 215                 220

Tyr Phe Asn Glu Asn Gly Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu
225                 230                 235                 240

Asp Lys Met Phe Tyr Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val
                245                 250                 255

Phe Asn Thr Pro Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu
            260                 265                 270

Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp
        275                 280                 285
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Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr
290 295 300

<210> 270
<211> 360
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 270

Arg Gly Ser His His His His His His Gly Met Ala Ser Met Thr Gly
1 5 10 15

Gly Gln Gln Met Gly Arg Asp Leu Tyr Asp Asp Asp Asp Lys Asp Arg
20 25 30

Trp Gly Ser Ser Arg Ile Thr Arg Ala Ser Thr Gly Tyr Thr Ser Ile
35 40 45

Asn Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly
50 55 60

Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
65 70 75 80

His Asn Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Lys Phe
85 90 95

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala
100 105 110

Val Thr Gly Leu Arg Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
115 120 125

Asn Thr Ala Val Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys
130 135 140

Tyr Tyr Phe Asn Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile
145 150 155 160

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```
Ile Ser Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile
                165                 170                 175

Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
            180                 185                 190

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
        195                 200                 205

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser Lys
    210                 215                 220

Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr Phe Glu
225                 230                 235                 240

Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile Asp Asn Lys
                245                 250                 255

Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly Val Phe Lys Gly
            260                 265                 270

Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn
        275                 280                 285

Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu His Leu Leu
    290                 295                 300

Gly Lys Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Val Thr Gly Trp
305                 310                 315                 320

Gln Thr Ile Asn Gly Lys Val Tyr Tyr Phe Met Pro Asp Thr Ala Met
                325                 330                 335

Ala Ala Ala Gly Gly Leu Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe
            340                 345                 350

Gly Val Asp Gly Val Lys Ala Pro
        355                 360
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<210> 271
<211> 329
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<220>
<221> VARIANT
<222> (327)..(327)
<223> Xaa is any amino acid

<400> 271

Ala Ser Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn
1 5 10 15

Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe
20 25 30

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
35 40 45

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr
50 55 60

Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile Asp
65 70 75 80

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr Gly
85 90 95

Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ser
100 105 110

Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys His Phe Tyr Phe
115 120 125

Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly
130 135 140

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```
Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly
145                 150                 155                 160

Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn Ile
                165                 170                 175

Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr Ile
            180                 185                 190

Asp Gly Asn Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn
        195                 200                 205

Gly Tyr Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu
    210                 215                 220

Pro Gln Ile Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala
225                 230                 235                 240

Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr
                245                 250                 255

Gln Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
            260                 265                 270

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
        275                 280                 285

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe Glu
    290                 295                 300

Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala Pro
305                 310                 315                 320

Thr Glu Ser Thr Cys Arg Xaa Gln Ala
                325

<210>  272
<211>  369
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<212> PRT
<213> Artificial sequence

<220>
<223> Synthetic amino acid sequence

<220>
<221> VARIANT
<222> (367)..(367)
<223> Xaa is any amino acid.

<220>
<221> VARIANT
<222> (368)..(368)
<223> Xaa is any amino acid.

<400> 272

Arg Gly Ser His His His His His His Gly Met Ala Ser Met Thr Gly
1 5 10 15

Gly Gln Gln Met Gly Arg Asp Leu Tyr Asp Asp Asp Asp Lys Asp Arg
20 25 30

Trp Gly Ser Ser Arg Ile Thr Arg Ala Ser Thr Gly Tyr Thr Ser Ile
35 40 45

Asn Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly
50 55 60

Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
65 70 75 80

His Asn Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Lys Phe
85 90 95

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala
100 105 110

Val Thr Gly Leu Arg Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
115 120 125

Asn Thr Ala Val Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys

```
    130                 135                 140

Tyr Tyr Phe Asn Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile
145                 150                 155                 160

Ile Ser Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile
                165                 170                 175

Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
            180                 185                 190

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
        195                 200                 205

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser Lys
    210                 215                 220

Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr Phe Glu
225                 230                 235                 240

Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile Asp Asn Lys
                245                 250                 255

Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly Val Phe Lys Gly
            260                 265                 270

Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn
        275                 280                 285

Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu His Leu Leu
    290                 295                 300

Gly Lys Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Val Thr Gly Trp
305                 310                 315                 320

Gln Thr Ile Asn Gly Lys Val Tyr Tyr Phe Met Pro Asp Thr Ala Met
                325                 330                 335

Ala Ala Ala Gly Gly Leu Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe
```

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340 345 350

Gly Val Asp Gly Val Lys Ala Pro Thr Glu Ser Thr Cys Arg Xaa Gln
355 360 365

Ala

<210> 273
<211> 360
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 273

Arg Gly Ser His His His His His His Gly Met Ala Ser Met Thr Gly
1 5 10 15

Gly Gln Gln Met Gly Arg Asp Leu Tyr Asp Asp Asp Asp Lys Asp Arg
20 25 30

Trp Gly Ser Ser Arg Ile Thr Arg Ala Ser Thr Gly Tyr Thr Ser Ile
35 40 45

Asn Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly
50 55 60

Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
65 70 75 80

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Lys Phe
85 90 95

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala
100 105 110

Val Thr Gly Leu Arg Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
115 120 125

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```
Asn Thr Ala Val Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys
    130                 135                 140

Tyr Tyr Phe Asn Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile
145                 150                 155                 160

Ile Ser Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile
                165                 170                 175

Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
            180                 185                 190

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
        195                 200                 205

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser Lys
    210                 215                 220

Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr Phe Glu
225                 230                 235                 240

Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile Asp Asn Lys
                245                 250                 255

Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly Val Phe Lys Gly
            260                 265                 270

Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn
        275                 280                 285

Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu His Leu Leu
    290                 295                 300

Gly Lys Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Val Thr Gly Trp
305                 310                 315                 320

Gln Thr Ile Asn Gly Lys Val Tyr Tyr Phe Met Pro Asp Thr Ala Met
                325                 330                 335
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Ala Ala Ala Gly Gly Leu Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe
340 345 350

Gly Val Asp Gly Val Lys Ala Pro
355 360

<210> 274
<211> 329
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<220>
<221> VARIANT
<222> (327)..(327)
<223> Xaa is any amino acid.

<400> 274

Ala Ser Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn
1 5 10 15

Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe
20 25 30

Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln
35 40 45

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr
50 55 60

Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile Asp
65 70 75 80

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr Gly
85 90 95

Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ser
100 105 110

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```
Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys His Phe Tyr Phe
        115                 120                 125

Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly
    130                 135                 140

Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly
145                 150                 155                 160

Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn Ile
                165                 170                 175

Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr Ile
            180                 185                 190

Asp Gly Asn Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn
        195                 200                 205

Gly Tyr Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu
    210                 215                 220

Pro Gln Ile Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala
225                 230                 235                 240

Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr
                245                 250                 255

Gln Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
            260                 265                 270

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
        275                 280                 285

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe Glu
    290                 295                 300

Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala Pro
305                 310                 315                 320
```

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Thr Glu Ser Thr Cys Arg Xaa Gln Ala
325

<210> 275
<211> 369
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<220>
<221> VARIANT
<222> (367)..(367)
<223> Xaa is any amino acid

<400> 275

Arg Gly Ser His His His His His His Gly Met Ala Ser Met Thr Gly
1 5 10 15

Gly Gln Gln Met Gly Arg Asp Leu Tyr Asp Asp Asp Asp Lys Asp Arg
20 25 30

Trp Gly Ser Ser Arg Ile Thr Arg Ala Ser Thr Gly Tyr Thr Ser Ile
35 40 45

Asn Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly
50 55 60

Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
65 70 75 80

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Lys Phe
85 90 95

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala
100 105 110

Val Thr Gly Leu Arg Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
115 120 125

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Asn Thr Ala Val Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys
130 135 140

Tyr Tyr Phe Asn Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile
145 150 155 160

Ile Ser Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile
165 170 175

Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
180 185 190

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
195 200 205

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser Lys
210 215 220

Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr Phe Glu
225 230 235 240

Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile Asp Asn Lys
245 250 255

Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly Val Phe Lys Gly
260 265 270

Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn
275 280 285

Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu His Leu Leu
290 295 300

Gly Lys Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Val Thr Gly Trp
305 310 315 320

Gln Thr Ile Asn Gly Lys Val Tyr Tyr Phe Met Pro Asp Thr Ala Met
325 330 335

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Ala Ala Ala Gly Gly Leu Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe
340 345 350

Gly Val Asp Gly Val Lys Ala Pro Thr Glu Ser Thr Cys Arg Xaa Gln
355 360 365

Ala

<210> 276
<211> 2710
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 276

Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1 5 10 15

Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
20 25 30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
35 40 45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn
50 55 60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65 70 75 80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Ala Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
100 105 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu

```
        115                 120                 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
    130                 135                 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Ala Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Pro Arg Pro Ser
    290                 295                 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
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325 330 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
340 345 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
355 360 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
370 375 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385 390 395 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
405 410 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
420 425 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
435 440 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
450 455 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465 470 475 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
485 490 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
500 505 510

Gln Gln Ile Asn Ser Leu Ala Ser Phe Asp Gln Ala Ser Ala Lys Tyr
515 520 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu

530 535 540

Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545 550 555 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
565 570 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
580 585 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
595 600 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
610 615 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625 630 635 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
645 650 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
660 665 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
675 680 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser
690 695 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705 710 715 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser
725 730 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly

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740 745 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
755 760 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
770 775 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785 790 795 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
805 810 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
820 825 830

Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
835 840 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
850 855 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865 870 875 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
885 890 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
900 905 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
915 920 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
930 935 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr

945 950 955 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
965 970 975

Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
980 985 990

Ala Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln
995 1000 1005

Leu Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val
1010 1015 1020

Leu Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu
1025 1030 1035

Asp Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu
1040 1045 1050

His Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val
1055 1060 1065

Leu Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser
1070 1075 1080

Ile Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile
1085 1090 1095

Ala Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu
1100 1105 1110

Ile Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His
1115 1120 1125

Leu Ser Glu Ser Lys Glu Tyr Gly Pro Leu Lys Thr Glu Asp Asp
1130 1135 1140

Lys Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp

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1145 1150 1155

Phe Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala
1160 1165 1170

Met Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His
1175 1180 1185

Phe Phe Ser Ser Pro Tyr Ile Ser Ser His Ile Pro Ser Leu Ser
1190 1195 1200

Val Tyr Ser Ala Ile Gly Ile Lys Thr Glu Asn Leu Asp Phe Ser
1205 1210 1215

Lys Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp
1220 1225 1230

Trp Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asn
1235 1240 1245

Gly Thr Lys Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys
1250 1255 1260

Phe Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr
1265 1270 1275

Leu Lys Pro Val Tyr Glu Asp Thr Asn Thr Lys Ile Lys Leu Asp
1280 1285 1290

Lys Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asp Glu
1295 1300 1305

Ile Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr
1310 1315 1320

Tyr Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Met Asn Ile Asn
1325 1330 1335

Leu Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val

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1340 1345 1350

Arg Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Asn Leu
1355 1360 1365

Ile Glu Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu
1370 1375 1380

Ile Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn
1385 1390 1395

Lys Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile
1400 1405 1410

Ser Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu
1415 1420 1425

Leu Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn
1430 1435 1440

Thr Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile
1445 1450 1455

Ala Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala
1460 1465 1470

Ile Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp
1475 1480 1485

Ser Lys Asn Ile Leu Glu Phe Tyr Asn Gly Ser Thr Leu Glu Phe
1490 1495 1500

Asn Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys
1505 1510 1515

Asp Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn
1520 1525 1530

Thr Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn

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1535 1540 1545

Gln Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser
1550 1555 1560

Ser Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr
1565 1570 1575

Ser Asn Phe Met Asn Leu Phe Leu Asn Asn Ile Ser Phe Trp Lys
1580 1585 1590

Leu Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe
1595 1600 1605

Thr Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys
1610 1615 1620

Asp Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr
1625 1630 1635

Ser Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val
1640 1645 1650

Val Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser
1655 1660 1665

Thr Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg
1670 1675 1680

Tyr Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu
1685 1690 1695

Ile Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu
1700 1705 1710

Ile Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile
1715 1720 1725

Asn Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly

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1730 1735 1740

Ser Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys
1745 1750 1755

Ile Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln
1760 1765 1770

Ser Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu
1775 1780 1785

Ser Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu
1790 1795 1800

Asn Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn
1805 1810 1815

Lys Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu
1820 1825 1830

Ile Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Ser
1835 1840 1845

Asn Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr
1850 1855 1860

Phe Asp Ile Asn Thr Gly Ala Ala Ser Thr Ser Tyr Lys Ile Ile
1865 1870 1875

Asn Gly Lys His Phe Tyr Phe Asn Asn Asn Gly Val Met Gln Leu
1880 1885 1890

Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala
1895 1900 1905

Asn Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln
1910 1915 1920

Ser Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn

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1925 1930 1935

Asp Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys
1940 1945 1950

Tyr Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln
1955 1960 1965

Val Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile
1970 1975 1980

Ile Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe
1985 1990 1995

Asp Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp
2000 2005 2010

Gly Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly
2015 2020 2025

Val Phe Ser Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2030 2035 2040

Thr Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
2045 2050 2055

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
2060 2065 2070

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr
2075 2080 2085

Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr
2090 2095 2100

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala
2105 2110 2115

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn

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2120 2125 2130

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
2135 2140 2145

Lys Tyr Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2150 2155 2160

Phe Lys Val Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2165 2170 2175

His Asn Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Lys
2180 2185 2190

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser
2195 2200 2205

Lys Ala Ile Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Asn Asn Ala Ile Ala Ala Thr His Leu Cys Thr Ile
2225 2230 2235

Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn
2240 2245 2250

Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn
2255 2260 2265

Asn Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly
2270 2275 2280

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu
2285 2290 2295

Gly Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly
2300 2305 2310

Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp

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2315 2320 2325

Gln Thr Ile Asp Ser Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala
2330 2335 2340

Val Ala Val Thr Gly Trp Gln Thr Ile Asp Gly Glu Lys Tyr Tyr
2345 2350 2355

Phe Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2360 2365 2370

Asp Gly Lys Arg Tyr Tyr Phe Asn Thr Asn Thr Tyr Ile Ala Ser
2375 2380 2385

Thr Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr Phe Asn Thr
2390 2395 2400

Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly Phe
2405 2410 2415

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2420 2425 2430

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2435 2440 2445

Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg
2450 2455 2460

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val
2465 2470 2475

Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
2480 2485 2490

Asn Thr Asn Thr Tyr Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser
2495 2500 2505

Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly

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2510 2515 2520

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2525 2530 2535

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2540 2545 2550

Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asp
2555 2560 2565

Ser Lys Ala Ala Thr Gly Trp Ala Thr Ile Asp Gly Asn Arg Tyr
2570 2575 2580

Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr
2585 2590 2595

Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile
2600 2605 2610

Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala
2615 2620 2625

Asn Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg Tyr Gln
2630 2635 2640

Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Ser Lys Val
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly

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2705 2710

<210> 277
<211> 2710
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 277

Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1 5 10 15

Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
20 25 30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
35 40 45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr
50 55 60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65 70 75 80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Ala Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
100 105 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
115 120 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
130 135 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145 150 155 160

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Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
165 170 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
180 185 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
195 200 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg
210 215 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225 230 235 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
245 250 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
260 265 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Ala Met
275 280 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
290 295 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
325 330 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
340 345 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
355 360 365

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Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
    370                 375                 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385                 390                 395                 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
                405                 410                 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
            420                 425                 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
        435                 440                 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
    450                 455                 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465                 470                 475                 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
                485                 490                 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
            500                 505                 510

Gln Gln Ile Asn Ser Leu Ala Ser Phe Asp Gln Ala Ser Ala Lys Tyr
        515                 520                 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
    530                 535                 540

Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545                 550                 555                 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
                565                 570                 575
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Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
580 585 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
595 600 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
610 615 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625 630 635 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
645 650 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
660 665 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
675 680 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser
690 695 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705 710 715 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser
725 730 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
740 745 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
755 760 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
770 775 780

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```
Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785                 790                 795                 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
                805                 810                 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
            820                 825                 830

Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
        835                 840                 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
    850                 855                 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865                 870                 875                 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
                885                 890                 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
            900                 905                 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
        915                 920                 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
    930                 935                 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945                 950                 955                 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
                965                 970                 975

Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
            980                 985                 990
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Ala Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln
995 1000 1005

Leu Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val
1010 1015 1020

Leu Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu
1025 1030 1035

Asp Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu
1040 1045 1050

His Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val
1055 1060 1065

Leu Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser
1070 1075 1080

Ile Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile
1085 1090 1095

Ala Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu
1100 1105 1110

Ile Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His
1115 1120 1125

Leu Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp
1130 1135 1140

Lys Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp
1145 1150 1155

Phe Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala
1160 1165 1170

Met Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His
1175 1180 1185

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```
Phe Phe  Ser Ser Pro Ser Ile  Ser Ser His Ile Pro  Ser Leu Ser
    1190                 1195                 1200

Ile Tyr  Ser Ala Ile Gly Ile  Glu Thr Glu Asn Leu  Asp Phe Ser
    1205                 1210                 1215

Lys Lys  Ile Met Met Leu Pro  Asn Ala Pro Ser Arg  Val Phe Trp
    1220                 1225                 1230

Trp Glu  Thr Gly Ala Val Pro  Gly Leu Arg Ser Leu  Glu Asn Asp
    1235                 1240                 1245

Gly Thr  Arg Leu Leu Asp Ser  Ile Arg Asp Leu Tyr  Pro Gly Lys
    1250                 1255                 1260

Phe Tyr  Trp Arg Phe Tyr Ala  Phe Phe Asp Tyr Ala  Ile Thr Thr
    1265                 1270                 1275

Leu Lys  Pro Val Tyr Glu Asp  Thr Asn Ile Lys Ile  Lys Leu Asp
    1280                 1285                 1290

Lys Asp  Thr Arg Asn Phe Ile  Met Pro Thr Ile Thr  Thr Asn Glu
    1295                 1300                 1305

Ile Arg  Asn Lys Leu Ser Tyr  Ser Phe Asp Gly Ala  Gly Gly Thr
    1310                 1315                 1320

Tyr Ser  Leu Leu Leu Ser Ser  Tyr Pro Ile Ser Thr  Asn Ile Asn
    1325                 1330                 1335

Leu Ser  Lys Asp Asp Leu Trp  Ile Phe Asn Ile Asp  Asn Glu Val
    1340                 1345                 1350

Arg Glu  Ile Ser Ile Glu Asn  Gly Thr Ile Lys Lys  Gly Lys Leu
    1355                 1360                 1365

Ile Lys  Asp Val Leu Ser Lys  Ile Asp Ile Asn Lys  Asn Lys Leu
    1370                 1375                 1380
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```
Ile Ile  Gly Asn Gln Thr Ile  Asp Phe Ser Gly Asp  Ile Asp Asn
    1385                1390                1395

Lys Asp  Arg Tyr Ile Phe Leu  Thr Cys Glu Leu Asp  Asp Lys Ile
    1400                1405                1410

Ser Leu  Ile Ile Glu Ile Asn  Leu Val Ala Lys Ser  Tyr Ser Leu
    1415                1420                1425

Leu Leu  Ser Gly Asp Lys Asn  Tyr Leu Ile Ser Asn  Leu Ser Asn
    1430                1435                1440

Thr Ile  Glu Lys Ile Asn Thr  Leu Gly Leu Asp Ser  Lys Asn Ile
    1445                1450                1455

Ala Tyr  Asn Tyr Thr Asp Glu  Ser Asn Asn Lys Tyr  Phe Gly Ala
    1460                1465                1470

Ile Ser  Lys Thr Ser Gln Lys  Ser Ile Ile His Tyr  Lys Lys Asp
    1475                1480                1485

Ser Lys  Asn Ile Leu Glu Phe  Tyr Asn Asp Ser Thr  Leu Glu Phe
    1490                1495                1500

Asn Ser  Lys Asp Phe Ile Ala  Glu Asp Ile Asn Val  Phe Met Lys
    1505                1510                1515

Asp Asp  Ile Asn Thr Ile Thr  Gly Lys Tyr Tyr Val  Asp Asn Asn
    1520                1525                1530

Thr Asp  Lys Ser Ile Asp Phe  Ser Ile Ser Leu Val  Ser Lys Asn
    1535                1540                1545

Gln Val  Lys Val Asn Gly Leu  Tyr Leu Asn Glu Ser  Val Tyr Ser
    1550                1555                1560

Ser Tyr  Leu Asp Phe Val Lys  Asn Ser Asp Gly His  His Asn Thr
    1565                1570                1575
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```
Ser Asn  Phe Met Asn Leu Phe  Leu Asp Asn Ile Ser  Phe Trp Lys
    1580                1585                1590

Leu Phe  Gly Phe Glu Asn Ile  Asn Phe Val Ile Asp  Lys Tyr Phe
    1595                1600                1605

Thr Leu  Val Gly Lys Thr Asn  Leu Gly Tyr Val Glu  Phe Ile Cys
    1610                1615                1620

Asp Asn  Asn Lys Asn Ile Asp  Ile Tyr Phe Gly Glu  Trp Lys Thr
    1625                1630                1635

Ser Ser  Ser Lys Ser Thr Ile  Phe Ser Gly Asn Gly  Arg Asn Val
    1640                1645                1650

Val Val  Glu Pro Ile Tyr Asn  Pro Asp Thr Gly Glu  Asp Ile Ser
    1655                1660                1665

Thr Ser  Leu Asp Phe Ser Tyr  Glu Pro Leu Tyr Gly  Ile Asp Arg
    1670                1675                1680

Tyr Ile  Asn Lys Val Leu Ile  Ala Pro Asp Leu Tyr  Thr Ser Leu
    1685                1690                1695

Ile Asn  Ile Asn Thr Asn Tyr  Tyr Ser Asn Glu Tyr  Tyr Pro Glu
    1700                1705                1710

Ile Ile  Val Leu Asn Pro Asn  Thr Phe His Lys Lys  Val Asn Ile
    1715                1720                1725

Asn Leu  Asp Ser Ser Ser Phe  Glu Tyr Lys Trp Ser  Thr Glu Gly
    1730                1735                1740

Ser Asp  Phe Ile Leu Val Arg  Tyr Leu Glu Glu Ser  Asn Lys Lys
    1745                1750                1755

Ile Leu  Gln Lys Ile Arg Ile  Lys Gly Ile Leu Ser  Asn Thr Gln
    1760                1765                1770
```

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Ser Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu
1775 1780 1785

Ser Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu
1790 1795 1800

Asn Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn
1805 1810 1815

Lys Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu
1820 1825 1830

Ile Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe
1835 1840 1845

Asn Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr
1850 1855 1860

Phe Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile
1865 1870 1875

Asn Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu
1880 1885 1890

Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala
1895 1900 1905

Asn Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln
1910 1915 1920

Ser Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn
1925 1930 1935

Asp Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys
1940 1945 1950

Tyr Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln
1955 1960 1965

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Val Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile
1970 1975 1980

Ile Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe
1985 1990 1995

Asp Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp
2000 2005 2010

Gly Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly
2015 2020 2025

Val Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2030 2035 2040

Thr Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
2045 2050 2055

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
2060 2065 2070

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr
2075 2080 2085

Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr
2090 2095 2100

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala
2105 2110 2115

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2120 2125 2130

Thr Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
2135 2140 2145

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2150 2155 2160

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Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2165 2170 2175

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu
2180 2185 2190

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser
2195 2200 2205

Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile
2225 2230 2235

Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn
2240 2245 2250

Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn
2255 2260 2265

Asn Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly
2270 2275 2280

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu
2285 2290 2295

Gly Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly
2300 2305 2310

Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp
2315 2320 2325

Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala
2330 2335 2340

Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr
2345 2350 2355

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```
Phe Asn  Leu Asn Thr Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile
    2360                2365                2370

Asp Gly  Lys Lys Tyr Tyr Phe  Asn Thr Asn Thr Phe  Ile Ala Ser
    2375                2380                2385

Thr Gly  Tyr Thr Ser Ile Asn  Gly Lys His Phe Tyr  Phe Asn Thr
    2390                2395                2400

Asp Gly  Ile Met Gln Ile Gly  Val Phe Lys Gly Pro  Asn Gly Phe
    2405                2410                2415

Glu Tyr  Phe Ala Pro Ala Asn  Thr His Asn Asn Asn  Ile Glu Gly
    2420                2425                2430

Gln Ala  Ile Leu Tyr Gln Asn  Lys Phe Leu Thr Leu  Asn Gly Lys
    2435                2440                2445

Lys Tyr  Tyr Phe Gly Ser Asp  Ser Lys Ala Val Thr  Gly Leu Arg
    2450                2455                2460

Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn Thr Asn  Thr Ala Val
    2465                2470                2475

Ala Val  Thr Gly Trp Gln Thr  Ile Asn Gly Lys Lys  Tyr Tyr Phe
    2480                2485                2490

Asn Thr  Asn Thr Ser Ile Ala  Ser Thr Gly Tyr Thr  Ile Ile Ser
    2495                2500                2505

Gly Lys  His Phe Tyr Phe Asn  Thr Asp Gly Ile Met  Gln Ile Gly
    2510                2515                2520

Val Phe  Lys Gly Pro Asp Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2525                2530                2535

Thr Asp  Ala Asn Asn Ile Glu  Gly Gln Ala Ile Arg  Tyr Gln Asn
    2540                2545                2550
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Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn
2555 2560 2565

Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr
2570 2575 2580

Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr
2585 2590 2595

Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile
2600 2605 2610

Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala
2615 2620 2625

Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln
2630 2635 2640

Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly
2705 2710

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<211> 2710
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

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<400> 278

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Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
            20                  25                  30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
        35                  40                  45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn
    50                  55                  60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65                  70                  75                  80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Ala Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
            100                 105                 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
        115                 120                 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
    130                 135                 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
```

195 200 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg
210 215 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225 230 235 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
245 250 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
260 265 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Ala Met
275 280 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Pro Arg Pro Ser
290 295 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
325 330 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
340 345 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
355 360 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
370 375 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385 390 395 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala

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405 410 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
420 425 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
435 440 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
450 455 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465 470 475 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
485 490 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
500 505 510

Gln Gln Ile Asn Ser Leu Ala Ser Phe Asp Gln Ala Ser Ala Lys Tyr
515 520 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
530 535 540

Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545 550 555 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
565 570 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
580 585 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
595 600 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser

610 615 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625 630 635 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
645 650 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
660 665 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
675 680 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser
690 695 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705 710 715 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser
725 730 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
740 745 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
755 760 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
770 775 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785 790 795 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
805 810 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser

820 825 830

Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
835 840 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
850 855 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865 870 875 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
885 890 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
900 905 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
915 920 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
930 935 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945 950 955 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
965 970 975

Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
980 985 990

Ala Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln
995 1000 1005

Leu Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val
1010 1015 1020

Leu Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu

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1025 1030 1035

Asp Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu
1040 1045 1050

His Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val
1055 1060 1065

Leu Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser
1070 1075 1080

Ile Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile
1085 1090 1095

Ala Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu
1100 1105 1110

Ile Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His
1115 1120 1125

Leu Ser Glu Ser Lys Glu Tyr Gly Pro Leu Lys Thr Glu Asp Asp
1130 1135 1140

Lys Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp
1145 1150 1155

Phe Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala
1160 1165 1170

Met Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His
1175 1180 1185

Phe Phe Ser Ser Pro Tyr Ile Ser Ser His Ile Pro Ser Leu Ser
1190 1195 1200

Val Tyr Ser Ala Ile Gly Ile Lys Thr Glu Asn Leu Asp Phe Ser
1205 1210 1215

Lys Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp

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1220 1225 1230

Trp Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asn
1235 1240 1245

Gly Thr Lys Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys
1250 1255 1260

Phe Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr
1265 1270 1275

Leu Lys Pro Val Tyr Glu Asp Thr Asn Thr Lys Ile Lys Leu Asp
1280 1285 1290

Lys Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asp Glu
1295 1300 1305

Ile Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr
1310 1315 1320

Tyr Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Met Asn Ile Asn
1325 1330 1335

Leu Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val
1340 1345 1350

Arg Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Asn Leu
1355 1360 1365

Ile Glu Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu
1370 1375 1380

Ile Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn
1385 1390 1395

Lys Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile
1400 1405 1410

Ser Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu

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1415 1420 1425

Leu Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn
1430 1435 1440

Thr Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile
1445 1450 1455

Ala Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala
1460 1465 1470

Ile Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp
1475 1480 1485

Ser Lys Asn Ile Leu Glu Phe Tyr Asn Gly Ser Thr Leu Glu Phe
1490 1495 1500

Asn Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys
1505 1510 1515

Asp Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn
1520 1525 1530

Thr Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn
1535 1540 1545

Gln Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser
1550 1555 1560

Ser Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr
1565 1570 1575

Ser Asn Phe Met Asn Leu Phe Leu Asn Asn Ile Ser Phe Trp Lys
1580 1585 1590

Leu Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe
1595 1600 1605

Thr Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys

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1610 1615 1620

Asp Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr
1625 1630 1635

Ser Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val
1640 1645 1650

Val Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser
1655 1660 1665

Thr Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg
1670 1675 1680

Tyr Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu
1685 1690 1695

Ile Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu
1700 1705 1710

Ile Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile
1715 1720 1725

Asn Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly
1730 1735 1740

Ser Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys
1745 1750 1755

Ile Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln
1760 1765 1770

Ser Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu
1775 1780 1785

Ser Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu
1790 1795 1800

Asn Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn

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1805 1810 1815

Lys Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu
1820 1825 1830

Ile Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Ser
1835 1840 1845

Asn Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr
1850 1855 1860

Phe Asp Ile Asn Thr Gly Ala Ala Ser Thr Ser Tyr Lys Ile Ile
1865 1870 1875

Asn Gly Lys His Phe Tyr Phe Asn Asn Asn Gly Val Met Gln Leu
1880 1885 1890

Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala
1895 1900 1905

Asn Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln
1910 1915 1920

Ser Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn
1925 1930 1935

Asp Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys
1940 1945 1950

Tyr Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln
1955 1960 1965

Val Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile
1970 1975 1980

Ile Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe
1985 1990 1995

Asp Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp

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2000 2005 2010

Gly Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly
2015 2020 2025

Val Phe Ser Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2030 2035 2040

Thr Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
2045 2050 2055

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
2060 2065 2070

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr
2075 2080 2085

Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr
2090 2095 2100

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala
2105 2110 2115

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2120 2125 2130

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
2135 2140 2145

Lys Tyr Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2150 2155 2160

Phe Lys Val Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2165 2170 2175

His Asn Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Lys
2180 2185 2190

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser

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2195 2200 2205

Lys Ala Ile Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Asn Asn Ala Ile Ala Ala Thr His Leu Cys Thr Ile
2225 2230 2235

Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn
2240 2245 2250

Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn
2255 2260 2265

Asn Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly
2270 2275 2280

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu
2285 2290 2295

Gly Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly
2300 2305 2310

Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp
2315 2320 2325

Gln Thr Ile Asp Ser Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala
2330 2335 2340

Val Ala Val Thr Gly Trp Gln Thr Ile Asp Gly Glu Lys Tyr Tyr
2345 2350 2355

Phe Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2360 2365 2370

Asp Gly Lys Arg Tyr Tyr Phe Asn Thr Asn Thr Tyr Ile Ala Ser
2375 2380 2385

Thr Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr Phe Asn Thr

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2390 2395 2400

Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly Phe
2405 2410 2415

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2420 2425 2430

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2435 2440 2445

Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg
2450 2455 2460

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val
2465 2470 2475

Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
2480 2485 2490

Asn Thr Asn Thr Tyr Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser
2495 2500 2505

Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly
2510 2515 2520

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2525 2530 2535

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2540 2545 2550

Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asp
2555 2560 2565

Ser Lys Ala Ala Thr Gly Trp Ala Thr Ile Asp Gly Asn Arg Tyr
2570 2575 2580

Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr

```
    2585                2590                2595

Ile Asp  Asn Lys Asn Phe Tyr  Phe Arg Asn Gly Leu  Pro Gln Ile
    2600                2605                2610

Gly Val  Phe Lys Gly Pro Asn  Gly Phe Glu Tyr Phe  Ala Pro Ala
    2615                2620                2625

Asn Thr  Asp Ala Asn Asn Ile  Asp Gly Gln Ala Ile  Arg Tyr Gln
    2630                2635                2640

Asn Arg  Phe Leu His Leu Leu  Gly Lys Ile Tyr Tyr  Phe Gly Asn
    2645                2650                2655

Asn Ser  Lys Ala Val Thr Gly  Trp Gln Thr Ile Asn  Ser Lys Val
    2660                2665                2670

Tyr Tyr  Phe Met Pro Asp Thr  Ala Met Ala Ala Ala  Gly Gly Leu
    2675                2680                2685

Phe Glu  Ile Asp Gly Val Ile  Tyr Phe Phe Gly Val  Asp Gly Val
    2690                2695                2700

Lys Ala  Pro Gly Ile Tyr Gly
    2705                2710


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<211>  2710
<212>  PRT
<213>  Artificial Sequence

<220>
<223>  Synthetic amino acid sequence

<400>  279

Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
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Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
            20                  25                  30
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```
Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
        35                  40                  45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr
    50                  55                  60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65                  70                  75                  80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Ala Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
            100                 105                 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
        115                 120                 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
    130                 135                 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240
```

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```
Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Ala Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
    290                 295                 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
                325                 330                 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
            340                 345                 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
        355                 360                 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
    370                 375                 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385                 390                 395                 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
                405                 410                 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
            420                 425                 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
        435                 440                 445
```

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```
Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
    450                 455                 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465                 470                 475                 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
                485                 490                 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
            500                 505                 510

Gln Gln Ile Asn Ser Leu Ala Ser Phe Asp Gln Ala Ser Ala Lys Tyr
        515                 520                 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
    530                 535                 540

Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545                 550                 555                 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
                565                 570                 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
            580                 585                 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
        595                 600                 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
    610                 615                 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625                 630                 635                 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
                645                 650                 655
```

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```
Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
            660                 665                 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
        675                 680                 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser
    690                 695                 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705                 710                 715                 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser
                725                 730                 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
            740                 745                 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
        755                 760                 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
    770                 775                 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785                 790                 795                 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
                805                 810                 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
            820                 825                 830

Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
        835                 840                 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
    850                 855                 860
```

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```
Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865                 870                 875                 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
                885                 890                 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
            900                 905                 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
        915                 920                 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
    930                 935                 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945                 950                 955                 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
                965                 970                 975

Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
            980                 985                 990

Ala Gln Leu Phe Ser Thr Gly Leu  Asn Thr Ile Tyr Asp  Ser Ile Gln
        995                 1000                1005

Leu Val  Asn Leu Ile Ser Asn  Ala Val Asn Asp Thr  Ile Asn Val
    1010                1015                1020

Leu Pro  Thr Ile Thr Glu Gly  Ile Pro Ile Val Ser  Thr Ile Leu
    1025                1030                1035

Asp Gly  Ile Asn Leu Gly Ala  Ala Ile Lys Glu Leu  Leu Asp Glu
    1040                1045                1050

His Asp  Pro Leu Leu Lys Lys  Glu Leu Glu Ala Lys  Val Gly Val
    1055                1060                1065
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Leu Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser
1070 1075 1080

Ile Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile
1085 1090 1095

Ala Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu
1100 1105 1110

Ile Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His
1115 1120 1125

Leu Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp
1130 1135 1140

Lys Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp
1145 1150 1155

Phe Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala
1160 1165 1170

Met Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His
1175 1180 1185

Phe Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser
1190 1195 1200

Ile Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser
1205 1210 1215

Lys Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp
1220 1225 1230

Trp Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp
1235 1240 1245

Gly Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys
1250 1255 1260

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Phe Tyr  Trp Arg Phe Tyr Ala  Phe Phe Asp Tyr Ala  Ile Thr Thr
    1265                1270                1275

Leu Lys  Pro Val Tyr Glu Asp  Thr Asn Ile Lys Ile  Lys Leu Asp
    1280                1285                1290

Lys Asp  Thr Arg Asn Phe Ile  Met Pro Thr Ile Thr  Thr Asn Glu
    1295                1300                1305

Ile Arg  Asn Lys Leu Ser Tyr  Ser Phe Asp Gly Ala  Gly Gly Thr
    1310                1315                1320

Tyr Ser  Leu Leu Leu Ser Ser  Tyr Pro Ile Ser Thr  Asn Ile Asn
    1325                1330                1335

Leu Ser  Lys Asp Asp Leu Trp  Ile Phe Asn Ile Asp  Asn Glu Val
    1340                1345                1350

Arg Glu  Ile Ser Ile Glu Asn  Gly Thr Ile Lys Lys  Gly Lys Leu
    1355                1360                1365

Ile Lys  Asp Val Leu Ser Lys  Ile Asp Ile Asn Lys  Asn Lys Leu
    1370                1375                1380

Ile Ile  Gly Asn Gln Thr Ile  Asp Phe Ser Gly Asp  Ile Asp Asn
    1385                1390                1395

Lys Asp  Arg Tyr Ile Phe Leu  Thr Cys Glu Leu Asp  Asp Lys Ile
    1400                1405                1410

Ser Leu  Ile Ile Glu Ile Asn  Leu Val Ala Lys Ser  Tyr Ser Leu
    1415                1420                1425

Leu Leu  Ser Gly Asp Lys Asn  Tyr Leu Ile Ser Asn  Leu Ser Asn
    1430                1435                1440

Thr Ile  Glu Lys Ile Asn Thr  Leu Gly Leu Asp Ser  Lys Asn Ile
    1445                1450                1455
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Ala Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala
1460 1465 1470

Ile Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp
1475 1480 1485

Ser Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe
1490 1495 1500

Asn Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys
1505 1510 1515

Asp Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn
1520 1525 1530

Thr Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn
1535 1540 1545

Gln Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser
1550 1555 1560

Ser Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr
1565 1570 1575

Ser Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys
1580 1585 1590

Leu Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe
1595 1600 1605

Thr Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys
1610 1615 1620

Asp Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr
1625 1630 1635

Ser Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val
1640 1645 1650

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Val Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser
1655 1660 1665

Thr Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg
1670 1675 1680

Tyr Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu
1685 1690 1695

Ile Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu
1700 1705 1710

Ile Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile
1715 1720 1725

Asn Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly
1730 1735 1740

Ser Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys
1745 1750 1755

Ile Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln
1760 1765 1770

Ser Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu
1775 1780 1785

Ser Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu
1790 1795 1800

Asn Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn
1805 1810 1815

Lys Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu
1820 1825 1830

Ile Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe
1835 1840 1845

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Asn Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr
1850 1855 1860

Phe Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile
1865 1870 1875

Asn Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu
1880 1885 1890

Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala
1895 1900 1905

Asn Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln
1910 1915 1920

Ser Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn
1925 1930 1935

Asp Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys
1940 1945 1950

Tyr Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln
1955 1960 1965

Val Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile
1970 1975 1980

Ile Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe
1985 1990 1995

Asp Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp
2000 2005 2010

Gly Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly
2015 2020 2025

Val Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2030 2035 2040

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Thr Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
2045 2050 2055

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
2060 2065 2070

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr
2075 2080 2085

Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr
2090 2095 2100

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala
2105 2110 2115

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2120 2125 2130

Thr Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
2135 2140 2145

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2150 2155 2160

Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2165 2170 2175

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu
2180 2185 2190

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser
2195 2200 2205

Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile
2225 2230 2235

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Asn Asn  Asp Lys Tyr Tyr Phe  Ser Tyr Asp Gly Ile  Leu Gln Asn
    2240                2245                2250

Gly Tyr  Ile Thr Ile Glu Arg  Asn Asn Phe Tyr Phe  Asp Ala Asn
    2255                2260                2265

Asn Glu  Ser Lys Met Val Thr  Gly Val Phe Lys Gly  Pro Asn Gly
    2270                2275                2280

Phe Glu  Tyr Phe Ala Pro Ala  Asn Thr His Asn Asn  Asn Ile Glu
    2285                2290                2295

Gly Gln  Ala Ile Val Tyr Gln  Asn Lys Phe Leu Thr  Leu Asn Gly
    2300                2305                2310

Lys Lys  Tyr Tyr Phe Asp Asn  Asp Ser Lys Ala Val  Thr Gly Trp
    2315                2320                2325

Gln Thr  Ile Asp Gly Lys Lys  Tyr Tyr Phe Asn Leu  Asn Thr Ala
    2330                2335                2340

Glu Ala  Ala Thr Gly Trp Gln  Thr Ile Asp Gly Lys  Lys Tyr Tyr
    2345                2350                2355

Phe Asn  Leu Asn Thr Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile
    2360                2365                2370

Asp Gly  Lys Lys Tyr Tyr Phe  Asn Thr Asn Thr Phe  Ile Ala Ser
    2375                2380                2385

Thr Gly  Tyr Thr Ser Ile Asn  Gly Lys His Phe Tyr  Phe Asn Thr
    2390                2395                2400

Asp Gly  Ile Met Gln Ile Gly  Val Phe Lys Gly Pro  Asn Gly Phe
    2405                2410                2415

Glu Tyr  Phe Ala Pro Ala Asn  Thr His Asn Asn Asn  Ile Glu Gly
    2420                2425                2430
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Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2435 2440 2445

Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg
2450 2455 2460

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val
2465 2470 2475

Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
2480 2485 2490

Asn Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser
2495 2500 2505

Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly
2510 2515 2520

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2525 2530 2535

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2540 2545 2550

Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn
2555 2560 2565

Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr
2570 2575 2580

Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr
2585 2590 2595

Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile
2600 2605 2610

Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala
2615 2620 2625

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Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln
2630 2635 2640

Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly
2705 2710

<210> 280
<211> 2710
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 280

Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1 5 10 15

Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
20 25 30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
35 40 45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr
50 55 60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys

65 70 75 80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Ala Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
100 105 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
115 120 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
130 135 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145 150 155 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
165 170 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
180 185 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
195 200 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg
210 215 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225 230 235 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
245 250 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
260 265 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Ala Met

275 280 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
290 295 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
325 330 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
340 345 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
355 360 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
370 375 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385 390 395 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
405 410 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
420 425 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
435 440 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
450 455 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465 470 475 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp

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485 490 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
500 505 510

Gln Gln Ile Asn Ser Leu Ala Ser Phe Asp Gln Ala Ser Ala Lys Tyr
515 520 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
530 535 540

Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545 550 555 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
565 570 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
580 585 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
595 600 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
610 615 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625 630 635 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
645 650 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
660 665 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
675 680 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser

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690 695 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705 710 715 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser
725 730 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
740 745 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
755 760 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
770 775 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785 790 795 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
805 810 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
820 825 830

Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
835 840 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
850 855 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865 870 875 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
885 890 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr

900 905 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
915 920 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
930 935 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945 950 955 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
965 970 975

Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
980 985 990

Ala Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln
995 1000 1005

Leu Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val
1010 1015 1020

Leu Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu
1025 1030 1035

Asp Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu
1040 1045 1050

His Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val
1055 1060 1065

Leu Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser
1070 1075 1080

Ile Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile
1085 1090 1095

Ala Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu

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1100 1105 1110

Ile Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His
1115 1120 1125

Leu Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp
1130 1135 1140

Lys Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp
1145 1150 1155

Phe Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala
1160 1165 1170

Met Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His
1175 1180 1185

Phe Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser
1190 1195 1200

Ile Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser
1205 1210 1215

Lys Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp
1220 1225 1230

Trp Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp
1235 1240 1245

Gly Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys
1250 1255 1260

Phe Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr
1265 1270 1275

Leu Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp
1280 1285 1290

Lys Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu

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1295 1300 1305

Ile Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr
1310 1315 1320

Tyr Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn
1325 1330 1335

Leu Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val
1340 1345 1350

Arg Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu
1355 1360 1365

Ile Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu
1370 1375 1380

Ile Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn
1385 1390 1395

Lys Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile
1400 1405 1410

Ser Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu
1415 1420 1425

Leu Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn
1430 1435 1440

Thr Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile
1445 1450 1455

Ala Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala
1460 1465 1470

Ile Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp
1475 1480 1485

Ser Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe

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1490 1495 1500

Asn Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys
1505 1510 1515

Asp Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn
1520 1525 1530

Thr Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn
1535 1540 1545

Gln Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser
1550 1555 1560

Ser Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr
1565 1570 1575

Ser Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys
1580 1585 1590

Leu Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe
1595 1600 1605

Thr Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys
1610 1615 1620

Asp Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr
1625 1630 1635

Ser Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val
1640 1645 1650

Val Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser
1655 1660 1665

Thr Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg
1670 1675 1680

Tyr Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu

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1685 1690 1695

Ile Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu
1700 1705 1710

Ile Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile
1715 1720 1725

Asn Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly
1730 1735 1740

Ser Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys
1745 1750 1755

Ile Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln
1760 1765 1770

Ser Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu
1775 1780 1785

Ser Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu
1790 1795 1800

Asn Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn
1805 1810 1815

Lys Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu
1820 1825 1830

Ile Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe
1835 1840 1845

Asn Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr
1850 1855 1860

Phe Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile
1865 1870 1875

Asn Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu

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1880 1885 1890

Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala
1895 1900 1905

Asn Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln
1910 1915 1920

Ser Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn
1925 1930 1935

Asp Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys
1940 1945 1950

Tyr Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln
1955 1960 1965

Val Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile
1970 1975 1980

Ile Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe
1985 1990 1995

Asp Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp
2000 2005 2010

Gly Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly
2015 2020 2025

Val Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2030 2035 2040

Thr Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
2045 2050 2055

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
2060 2065 2070

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr

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2075 2080 2085

Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr
2090 2095 2100

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala
2105 2110 2115

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2120 2125 2130

Thr Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
2135 2140 2145

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2150 2155 2160

Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2165 2170 2175

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu
2180 2185 2190

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser
2195 2200 2205

Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile
2225 2230 2235

Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn
2240 2245 2250

Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn
2255 2260 2265

Asn Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly

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2270 2275 2280

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu
2285 2290 2295

Gly Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly
2300 2305 2310

Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp
2315 2320 2325

Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala
2330 2335 2340

Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr
2345 2350 2355

Phe Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2360 2365 2370

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser
2375 2380 2385

Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr
2390 2395 2400

Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe
2405 2410 2415

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2420 2425 2430

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2435 2440 2445

Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg
2450 2455 2460

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val

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2465 2470 2475

Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
2480 2485 2490

Asn Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser
2495 2500 2505

Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly
2510 2515 2520

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2525 2530 2535

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2540 2545 2550

Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn
2555 2560 2565

Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr
2570 2575 2580

Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr
2585 2590 2595

Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile
2600 2605 2610

Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala
2615 2620 2625

Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln
2630 2635 2640

Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val

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2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly
2705 2710

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<213> Artificial Sequence

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<223> Synthetic amino acid sequence

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Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
20 25 30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
35 40 45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr
50 55 60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65 70 75 80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Ala Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
100 105 110

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Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
        115                 120                 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
    130                 135                 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Ala Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
    290                 295                 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320
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Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
                325                 330                 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
            340                 345                 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
        355                 360                 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
    370                 375                 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385                 390                 395                 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
                405                 410                 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
            420                 425                 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
        435                 440                 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
    450                 455                 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465                 470                 475                 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
                485                 490                 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
            500                 505                 510

Gln Gln Ile Asn Ser Leu Ala Ser Phe Asp Gln Ala Ser Ala Lys Tyr
        515                 520                 525
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Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
    530                 535                 540

Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545                 550                 555                 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
                565                 570                 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
            580                 585                 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
        595                 600                 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
    610                 615                 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625                 630                 635                 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
                645                 650                 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
            660                 665                 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
        675                 680                 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser
    690                 695                 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705                 710                 715                 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser
                725                 730                 735
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Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
            740                 745                 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
        755                 760                 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
    770                 775                 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785                 790                 795                 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
                805                 810                 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
            820                 825                 830

Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
        835                 840                 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
    850                 855                 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865                 870                 875                 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
                885                 890                 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
            900                 905                 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
        915                 920                 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
    930                 935                 940
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Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945                 950                 955                 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
                965                 970                 975

Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
            980                 985                 990

Ala Gln Leu Phe Ser Thr Gly Leu  Asn Thr Ile Tyr Asp  Ser Ile Gln
        995                 1000                1005

Leu Val  Asn Leu Ile Ser Asn  Ala Val Asn Asp Thr  Ile Asn Val
    1010                1015                1020

Leu Pro  Thr Ile Thr Glu Gly  Ile Pro Ile Val Ser  Thr Ile Leu
    1025                1030                1035

Asp Gly  Ile Asn Leu Gly Ala  Ala Ile Lys Glu Leu  Leu Asp Glu
    1040                1045                1050

His Asp  Pro Leu Leu Lys Lys  Glu Leu Glu Ala Lys  Val Gly Val
    1055                1060                1065

Leu Ala  Ile Asn Met Ser Leu  Ser Ile Ala Ala Thr  Val Ala Ser
    1070                1075                1080

Ile Val  Gly Ile Gly Ala Glu  Val Thr Ile Phe Leu  Leu Pro Ile
    1085                1090                1095

Ala Gly  Ile Ser Ala Gly Ile  Pro Ser Leu Val Asn  Asn Glu Leu
    1100                1105                1110

Ile Leu  His Asp Lys Ala Thr  Ser Val Val Asn Tyr  Phe Asn His
    1115                1120                1125

Leu Ser  Glu Ser Lys Lys Tyr  Gly Pro Leu Lys Thr  Glu Asp Asp
    1130                1135                1140
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Lys Ile  Leu Val Pro Ile Asp  Asp Leu Val Ile Ser  Glu Ile Asp
    1145                1150                1155

Phe Asn  Asn Asn Ser Ile Lys  Leu Gly Thr Cys Asn  Ile Leu Ala
    1160                1165                1170

Met Glu  Gly Gly Ser Gly His  Thr Val Thr Gly Asn  Ile Asp His
    1175                1180                1185

Phe Phe  Ser Ser Pro Ser Ile  Ser Ser His Ile Pro  Ser Leu Ser
    1190                1195                1200

Ile Tyr  Ser Ala Ile Gly Ile  Glu Thr Glu Asn Leu  Asp Phe Ser
    1205                1210                1215

Lys Lys  Ile Met Met Leu Pro  Asn Ala Pro Ser Arg  Val Phe Trp
    1220                1225                1230

Trp Glu  Thr Gly Ala Val Pro  Gly Leu Arg Ser Leu  Glu Asn Asp
    1235                1240                1245

Gly Thr  Arg Leu Leu Asp Ser  Ile Arg Asp Leu Tyr  Pro Gly Lys
    1250                1255                1260

Phe Tyr  Trp Arg Phe Tyr Ala  Phe Phe Asp Tyr Ala  Ile Thr Thr
    1265                1270                1275

Leu Lys  Pro Val Tyr Glu Asp  Thr Asn Ile Lys Ile  Lys Leu Asp
    1280                1285                1290

Lys Asp  Thr Arg Asn Phe Ile  Met Pro Thr Ile Thr  Thr Asn Glu
    1295                1300                1305

Ile Arg  Asn Lys Leu Ser Tyr  Ser Phe Asp Gly Ala  Gly Gly Thr
    1310                1315                1320

Tyr Ser  Leu Leu Leu Ser Ser  Tyr Pro Ile Ser Thr  Asn Ile Asn
    1325                1330                1335
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Leu Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val
1340 1345 1350

Arg Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu
1355 1360 1365

Ile Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu
1370 1375 1380

Ile Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn
1385 1390 1395

Lys Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile
1400 1405 1410

Ser Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu
1415 1420 1425

Leu Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn
1430 1435 1440

Thr Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile
1445 1450 1455

Ala Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala
1460 1465 1470

Ile Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp
1475 1480 1485

Ser Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe
1490 1495 1500

Asn Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys
1505 1510 1515

Asp Asp Val Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn
1520 1525 1530

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Thr Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn
1535 1540 1545

Gln Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser
1550 1555 1560

Ser Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr
1565 1570 1575

Ser Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys
1580 1585 1590

Leu Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe
1595 1600 1605

Thr Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys
1610 1615 1620

Asp Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr
1625 1630 1635

Ser Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val
1640 1645 1650

Val Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser
1655 1660 1665

Thr Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg
1670 1675 1680

Tyr Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu
1685 1690 1695

Ile Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu
1700 1705 1710

Ile Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile
1715 1720 1725

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Asn Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly
1730 1735 1740

Ser Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys
1745 1750 1755

Ile Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln
1760 1765 1770

Ser Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu
1775 1780 1785

Ser Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu
1790 1795 1800

Asn Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn
1805 1810 1815

Lys Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu
1820 1825 1830

Ile Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe
1835 1840 1845

Asn Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr
1850 1855 1860

Phe Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile
1865 1870 1875

Asn Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu
1880 1885 1890

Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala
1895 1900 1905

Asn Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln
1910 1915 1920

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```
Ser Lys  Phe Leu Thr Leu Asn  Gly Lys Lys Tyr Tyr  Phe Asp Asn
    1925                1930                1935

Asn Ser  Lys Ala Val Thr Gly  Trp Arg Ile Ile Asn  Asn Glu Lys
    1940                1945                1950

Tyr Tyr  Phe Asn Pro Asn Asn  Ala Ile Ala Ala Val  Gly Leu Gln
    1955                1960                1965

Val Ile  Asp Asn Asn Lys Tyr  Tyr Phe Asn Pro Asp  Thr Ala Ile
    1970                1975                1980

Ile Ser  Lys Gly Trp Gln Thr  Val Asn Gly Ser Arg  Tyr Tyr Phe
    1985                1990                1995

Asp Thr  Asp Thr Ala Ile Ala  Phe Asn Gly Tyr Lys  Thr Ile Asp
    2000                2005                2010

Gly Lys  His Phe Tyr Phe Asp  Ser Asp Cys Val Val  Lys Ile Gly
    2015                2020                2025

Val Phe  Ser Thr Ser Asn Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2030                2035                2040

Thr Tyr  Asn Asn Asn Ile Glu  Gly Gln Ala Ile Val  Tyr Gln Ser
    2045                2050                2055

Lys Phe  Leu Thr Leu Asn Gly  Lys Lys Tyr Tyr Phe  Asp Asn Asn
    2060                2065                2070

Ser Lys  Ala Val Thr Gly Trp  Gln Thr Ile Asp Ser  Lys Lys Tyr
    2075                2080                2085

Tyr Phe  Asn Thr Asn Thr Ala  Glu Ala Ala Thr Gly  Trp Gln Thr
    2090                2095                2100

Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr Asn Thr  Ala Glu Ala
    2105                2110                2115
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Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2120 2125 2130

Thr Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
2135 2140 2145

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2150 2155 2160

Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2165 2170 2175

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu
2180 2185 2190

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser
2195 2200 2205

Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile
2225 2230 2235

Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn
2240 2245 2250

Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn
2255 2260 2265

Asn Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly
2270 2275 2280

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu
2285 2290 2295

Gly Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly
2300 2305 2310

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Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp
2315 2320 2325

Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala
2330 2335 2340

Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr
2345 2350 2355

Phe Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2360 2365 2370

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser
2375 2380 2385

Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr
2390 2395 2400

Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe
2405 2410 2415

Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly
2420 2425 2430

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2435 2440 2445

Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg
2450 2455 2460

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val
2465 2470 2475

Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
2480 2485 2490

Asn Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser
2495 2500 2505

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Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly
2510 2515 2520

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2525 2530 2535

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2540 2545 2550

Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn
2555 2560 2565

Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr
2570 2575 2580

Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr
2585 2590 2595

Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile
2600 2605 2610

Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala
2615 2620 2625

Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln
2630 2635 2640

Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

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Lys Ala Pro Gly Ile Tyr Gly
2705 2710

<210> 282
<211> 2710
<212> PRT
<213> Artificial Sequence

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<223> Synthetic amino acid sequence

<400> 282

Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
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Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
20 25 30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
35 40 45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn
50 55 60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65 70 75 80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Ala Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
100 105 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
115 120 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
130 135 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile

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145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Val Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Ala Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
    290                 295                 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
                325                 330                 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
            340                 345                 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
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355 360 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
370 375 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385 390 395 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
405 410 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
420 425 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
435 440 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
450 455 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465 470 475 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
485 490 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
500 505 510

Gln Gln Ile Asn Ser Leu Ala Ser Phe Asp Gln Ala Ser Ala Lys Tyr
515 520 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
530 535 540

Asp Asn Glu Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545 550 555 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser

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565 570 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
580 585 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
595 600 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
610 615 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625 630 635 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
645 650 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
660 665 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
675 680 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser
690 695 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705 710 715 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser
725 730 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
740 745 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
755 760 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser

770 775 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785 790 795 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Thr Ser Val Ser
805 810 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
820 825 830

Ser Val Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
835 840 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
850 855 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865 870 875 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
885 890 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
900 905 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
915 920 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
930 935 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945 950 955 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
965 970 975

Lys Asp Leu Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr

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980 985 990

Ala Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln
995 1000 1005

Leu Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val
1010 1015 1020

Leu Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu
1025 1030 1035

Asp Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu
1040 1045 1050

His Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val
1055 1060 1065

Leu Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser
1070 1075 1080

Ile Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile
1085 1090 1095

Ala Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu
1100 1105 1110

Ile Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His
1115 1120 1125

Leu Ser Glu Ser Lys Glu Tyr Gly Pro Leu Lys Thr Glu Asp Asp
1130 1135 1140

Lys Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp
1145 1150 1155

Phe Asn Asn Asn Ala Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala
1160 1165 1170

Met Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His

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1175 1180 1185

Phe Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser
1190 1195 1200

Ile Tyr Ser Ala Ile Gly Ile Lys Thr Glu Asn Leu Asp Phe Ser
1205 1210 1215

Lys Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp
1220 1225 1230

Trp Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asn
1235 1240 1245

Gly Thr Lys Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys
1250 1255 1260

Phe Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr
1265 1270 1275

Leu Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp
1280 1285 1290

Lys Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu
1295 1300 1305

Ile Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr
1310 1315 1320

Tyr Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn
1325 1330 1335

Leu Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val
1340 1345 1350

Arg Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu
1355 1360 1365

Ile Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu

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1370 1375 1380

Ile Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn
1385 1390 1395

Lys Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile
1400 1405 1410

Ser Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu
1415 1420 1425

Leu Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn
1430 1435 1440

Thr Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile
1445 1450 1455

Ala Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala
1460 1465 1470

Ile Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp
1475 1480 1485

Ser Lys Asn Ile Leu Glu Phe Tyr Asn Gly Ser Thr Leu Glu Phe
1490 1495 1500

Asn Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys
1505 1510 1515

Asp Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn
1520 1525 1530

Thr Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn
1535 1540 1545

Gln Ala Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser
1550 1555 1560

Ser Tyr Leu Asp Phe Val Lys Asn Ala Asp Gly His His Asn Thr

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1565 1570 1575

Ser Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys
1580 1585 1590

Leu Phe Gly Phe Glu Asn Ile Asn Phe Val Val Asp Lys Tyr Phe
1595 1600 1605

Thr Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys
1610 1615 1620

Asp Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr
1625 1630 1635

Ser Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val
1640 1645 1650

Val Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser
1655 1660 1665

Thr Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg
1670 1675 1680

Tyr Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu
1685 1690 1695

Ile Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu
1700 1705 1710

Ile Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile
1715 1720 1725

Asn Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly
1730 1735 1740

Ser Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys
1745 1750 1755

Ile Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln

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1760 1765 1770

Ser Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu
1775 1780 1785

Ser Leu Val Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu
1790 1795 1800

Asn Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn
1805 1810 1815

Lys Thr Tyr Tyr Tyr Asp Glu Ala Ser Lys Leu Val Lys Gly Leu
1820 1825 1830

Ile Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Ser
1835 1840 1845

Asn Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr
1850 1855 1860

Phe Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile
1865 1870 1875

Asn Gly Lys His Phe Tyr Phe Asn Asn Asn Gly Val Met Gln Leu
1880 1885 1890

Gly Val Phe Lys Gly Pro Asp Arg Phe Glu Tyr Phe Ala Pro Ala
1895 1900 1905

Asn Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln
1910 1915 1920

Ser Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn
1925 1930 1935

Asp Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys
1940 1945 1950

Tyr Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln

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1955 1960 1965

Val Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile
1970 1975 1980

Ile Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe
1985 1990 1995

Asp Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp
2000 2005 2010

Gly Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly
2015 2020 2025

Val Phe Ser Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2030 2035 2040

Thr Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
2045 2050 2055

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
2060 2065 2070

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr
2075 2080 2085

Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr
2090 2095 2100

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Val
2105 2110 2115

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2120 2125 2130

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
2135 2140 2145

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val

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2150 2155 2160

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2165 2170 2175

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Lys
2180 2185 2190

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Ala Ser Asp Ser
2195 2200 2205

Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Asn Asn Ala Ile Ala Ala Thr His Leu Tyr Thr Ile
2225 2230 2235

Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn
2240 2245 2250

Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn
2255 2260 2265

Asn Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly
2270 2275 2280

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu
2285 2290 2295

Gly Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly
2300 2305 2310

Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp
2315 2320 2325

Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala
2330 2335 2340

Val Ala Val Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr

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2345 2350 2355

Phe Asn Thr Asn Thr Ala Glu Thr Ala Thr Gly Trp Gln Thr Ile
2360 2365 2370

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ser Ile Ala Ser
2375 2380 2385

Thr Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr Phe Asn Thr
2390 2395 2400

Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly Phe
2405 2410 2415

Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly
2420 2425 2430

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2435 2440 2445

Lys Tyr Tyr Phe Ala Ser Asp Ser Lys Ala Val Thr Gly Leu Arg
2450 2455 2460

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu
2465 2470 2475

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2480 2485 2490

Asn Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn
2495 2500 2505

Asp Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly
2510 2515 2520

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2525 2530 2535

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn

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2540 2545 2550

Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn
2555 2560 2565

Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Arg Arg Tyr
2570 2575 2580

Tyr Phe Glu Pro Asn Thr Ala Ile Gly Ala Asn Gly Tyr Lys Ile
2585 2590 2595

Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile
2600 2605 2610

Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala
2615 2620 2625

Asn Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg Tyr Gln
2630 2635 2640

Asn Arg Phe Leu His Leu Leu Gly Asn Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Asn Met
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly
2705 2710

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<211> 2710
<212> PRT
<213> Artificial Sequence

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<220>
<223> Synthetic amino acid sequence

<400> 283

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1               5                  10                  15

Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
            20                  25                  30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
        35                  40                  45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr
    50                  55                  60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65                  70                  75                  80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Ala Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
            100                 105                 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
        115                 120                 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
    130                 135                 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
            180                 185                 190
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Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Ala Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
    290                 295                 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
                325                 330                 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
            340                 345                 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
        355                 360                 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
    370                 375                 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385                 390                 395                 400
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Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
                405                 410                 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
            420                 425                 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
        435                 440                 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
    450                 455                 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465                 470                 475                 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
                485                 490                 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
            500                 505                 510

Gln Gln Ile Asn Ser Leu Ala Ser Phe Asp Gln Ala Ser Ala Lys Tyr
        515                 520                 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
    530                 535                 540

Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545                 550                 555                 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
                565                 570                 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
            580                 585                 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
        595                 600                 605
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Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
610 615 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625 630 635 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
645 650 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
660 665 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
675 680 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser
690 695 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705 710 715 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser
725 730 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
740 745 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
755 760 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
770 775 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785 790 795 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
805 810 815

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```
Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
            820                 825                 830

Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
        835                 840                 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
    850                 855                 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865                 870                 875                 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
                885                 890                 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
            900                 905                 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
        915                 920                 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
    930                 935                 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945                 950                 955                 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
                965                 970                 975

Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
            980                 985                 990

Ala Gln Leu Phe Ser Thr Gly Leu  Asn Thr Ile Tyr Asp  Ser Ile Gln
        995                 1000                1005

Leu Val  Asn Leu Ile Ser Asn  Ala Val Asn Asp Thr  Ile Asn Val
    1010                1015                1020
```

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Leu Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu
1025 1030 1035

Asp Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu
1040 1045 1050

His Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val
1055 1060 1065

Leu Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser
1070 1075 1080

Ile Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile
1085 1090 1095

Ala Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu
1100 1105 1110

Ile Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His
1115 1120 1125

Leu Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp
1130 1135 1140

Lys Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp
1145 1150 1155

Phe Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala
1160 1165 1170

Met Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His
1175 1180 1185

Phe Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser
1190 1195 1200

Ile Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser
1205 1210 1215

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Lys Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp
1220 1225 1230

Trp Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp
1235 1240 1245

Gly Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys
1250 1255 1260

Phe Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr
1265 1270 1275

Leu Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp
1280 1285 1290

Lys Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu
1295 1300 1305

Ile Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr
1310 1315 1320

Tyr Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn
1325 1330 1335

Leu Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val
1340 1345 1350

Arg Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu
1355 1360 1365

Ile Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu
1370 1375 1380

Ile Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn
1385 1390 1395

Lys Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile
1400 1405 1410

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```
Ser Leu  Ile Ile Glu Ile Asn  Leu Val Ala Lys Ser  Tyr Ser Leu
    1415                1420                1425

Leu Leu  Ser Gly Asp Lys Asn  Tyr Leu Ile Ser Asn  Leu Ser Asn
    1430                1435                1440

Thr Ile  Glu Lys Ile Asn Thr  Leu Gly Leu Asp Ser  Lys Asn Ile
    1445                1450                1455

Ala Tyr  Asn Tyr Thr Asp Glu  Ser Asn Asn Lys Tyr  Phe Gly Ala
    1460                1465                1470

Ile Ser  Lys Thr Ser Gln Lys  Ser Ile Ile His Tyr  Lys Lys Asp
    1475                1480                1485

Ser Lys  Asn Ile Leu Glu Phe  Tyr Asn Asp Ser Thr  Leu Glu Phe
    1490                1495                1500

Asn Ser  Lys Asp Phe Ile Ala  Glu Asp Ile Asn Val  Phe Met Lys
    1505                1510                1515

Asp Asp  Val Asn Thr Ile Thr  Gly Lys Tyr Tyr Val  Asp Asn Asn
    1520                1525                1530

Thr Asp  Lys Ser Ile Asp Phe  Ser Ile Ser Leu Val  Ser Lys Asn
    1535                1540                1545

Gln Val  Lys Val Asn Gly Leu  Tyr Leu Asn Glu Ser  Val Tyr Ser
    1550                1555                1560

Ser Tyr  Leu Asp Phe Val Lys  Asn Ser Asp Gly His  His Asn Thr
    1565                1570                1575

Ser Asn  Phe Met Asn Leu Phe  Leu Asp Asn Ile Ser  Phe Trp Lys
    1580                1585                1590

Leu Phe  Gly Phe Glu Asn Ile  Asn Phe Val Ile Asp  Lys Tyr Phe
    1595                1600                1605
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Thr Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys
1610 1615 1620

Asp Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr
1625 1630 1635

Ser Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val
1640 1645 1650

Val Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser
1655 1660 1665

Thr Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg
1670 1675 1680

Tyr Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu
1685 1690 1695

Ile Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu
1700 1705 1710

Ile Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile
1715 1720 1725

Asn Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly
1730 1735 1740

Ser Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys
1745 1750 1755

Ile Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln
1760 1765 1770

Ser Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu
1775 1780 1785

Ser Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu
1790 1795 1800

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Asn Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn
1805 1810 1815

Lys Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu
1820 1825 1830

Ile Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe
1835 1840 1845

Asn Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr
1850 1855 1860

Phe Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile
1865 1870 1875

Asn Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu
1880 1885 1890

Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala
1895 1900 1905

Asn Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln
1910 1915 1920

Ser Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn
1925 1930 1935

Asn Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys
1940 1945 1950

Tyr Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln
1955 1960 1965

Val Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile
1970 1975 1980

Ile Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe
1985 1990 1995

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Asp Thr  Asp Thr Ala Ile Ala  Phe Asn Gly Tyr Lys  Thr Ile Asp
    2000                2005                2010

Gly Lys  His Phe Tyr Phe Asp  Ser Asp Cys Val Val  Lys Ile Gly
    2015                2020                2025

Val Phe  Ser Thr Ser Asn Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2030                2035                2040

Thr Tyr  Asn Asn Asn Ile Glu  Gly Gln Ala Ile Val  Tyr Gln Ser
    2045                2050                2055

Lys Phe  Leu Thr Leu Asn Gly  Lys Lys Tyr Tyr Phe  Asp Asn Asn
    2060                2065                2070

Ser Lys  Ala Val Thr Gly Trp  Gln Thr Ile Asp Ser  Lys Lys Tyr
    2075                2080                2085

Tyr Phe  Asn Thr Asn Thr Ala  Glu Ala Ala Thr Gly  Trp Gln Thr
    2090                2095                2100

Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr Asn Thr  Ala Glu Ala
    2105                2110                2115

Ala Thr  Gly Trp Gln Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn
    2120                2125                2130

Thr Asn  Thr Ala Ile Ala Ser  Thr Gly Tyr Thr Ile  Ile Asn Gly
    2135                2140                2145

Lys His  Phe Tyr Phe Asn Thr  Asp Gly Ile Met Gln  Ile Gly Val
    2150                2155                2160

Phe Lys  Gly Pro Asn Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr
    2165                2170                2175

Asp Ala  Asn Asn Ile Glu Gly  Gln Ala Ile Leu Tyr  Gln Asn Glu
    2180                2185                2190
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Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser
2195 2200 2205

Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile
2225 2230 2235

Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn
2240 2245 2250

Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn
2255 2260 2265

Asn Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly
2270 2275 2280

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu
2285 2290 2295

Gly Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly
2300 2305 2310

Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp
2315 2320 2325

Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala
2330 2335 2340

Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr
2345 2350 2355

Phe Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2360 2365 2370

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser
2375 2380 2385

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Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr
2390 2395 2400

Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe
2405 2410 2415

Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly
2420 2425 2430

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2435 2440 2445

Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg
2450 2455 2460

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val
2465 2470 2475

Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
2480 2485 2490

Asn Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser
2495 2500 2505

Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly
2510 2515 2520

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2525 2530 2535

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2540 2545 2550

Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn
2555 2560 2565

Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr
2570 2575 2580

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Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr
2585 2590 2595

Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile
2600 2605 2610

Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala
2615 2620 2625

Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln
2630 2635 2640

Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly
2705 2710

<210> 284
<211> 2710
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 284

Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1 5 10 15

Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu

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            20                  25                  30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
        35                  40                  45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn
    50                  55                  60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65                  70                  75                  80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Ala Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
            100                 105                 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
        115                 120                 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
    130                 135                 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Val Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
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225 230 235 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
245 250 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
260 265 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Ala Met
275 280 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
290 295 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
325 330 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
340 345 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
355 360 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
370 375 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385 390 395 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
405 410 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
420 425 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys

435 440 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
450 455 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465 470 475 480

Ile Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp
485 490 495

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
500 505 510

Gln Gln Ile Asn Ser Leu Ala Ser Phe Asp Gln Ala Ser Ala Lys Tyr
515 520 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
530 535 540

Asp Asn Glu Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545 550 555 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
565 570 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
580 585 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
595 600 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
610 615 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625 630 635 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly

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645 650 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
660 665 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
675 680 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser
690 695 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705 710 715 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser
725 730 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
740 745 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
755 760 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
770 775 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785 790 795 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Thr Ser Val Ser
805 810 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
820 825 830

Ser Val Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn
835 840 845

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu

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    850                 855                 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865                 870                 875                 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
                885                 890                 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
            900                 905                 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
        915                 920                 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
    930                 935                 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945                 950                 955                 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
                965                 970                 975

Lys Asp Leu Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
            980                 985                 990

Ala Gln Leu Phe Ser Thr Gly Leu  Asn Thr Ile Tyr Asp  Ser Ile Gln
        995                 1000                1005

Leu Val  Asn Leu Ile Ser Asn  Ala Val Asn Asp Thr  Ile Asn Val
    1010                1015                1020

Leu Pro  Thr Ile Thr Glu Gly  Ile Pro Ile Val Ser  Thr Ile Leu
    1025                1030                1035

Asp Gly  Ile Asn Leu Gly Ala  Ala Ile Lys Glu Leu  Leu Asp Glu
    1040                1045                1050

His Asp  Pro Leu Leu Lys Lys  Glu Leu Glu Ala Lys  Val Gly Val
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1055 1060 1065

Leu Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser
1070 1075 1080

Ile Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile
1085 1090 1095

Ala Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu
1100 1105 1110

Ile Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His
1115 1120 1125

Leu Ser Glu Ser Lys Glu Tyr Gly Pro Leu Lys Thr Glu Asp Asp
1130 1135 1140

Lys Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp
1145 1150 1155

Phe Asn Asn Asn Ala Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala
1160 1165 1170

Met Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His
1175 1180 1185

Phe Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser
1190 1195 1200

Ile Tyr Ser Ala Ile Gly Ile Lys Thr Glu Asn Leu Asp Phe Ser
1205 1210 1215

Lys Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp
1220 1225 1230

Trp Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asn
1235 1240 1245

Gly Thr Lys Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys

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1250 1255 1260

Phe Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr
1265 1270 1275

Leu Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp
1280 1285 1290

Lys Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu
1295 1300 1305

Ile Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr
1310 1315 1320

Tyr Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn
1325 1330 1335

Leu Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val
1340 1345 1350

Arg Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu
1355 1360 1365

Ile Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu
1370 1375 1380

Ile Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn
1385 1390 1395

Lys Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile
1400 1405 1410

Ser Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu
1415 1420 1425

Leu Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn
1430 1435 1440

Thr Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile

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1445 1450 1455

Ala Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala
1460 1465 1470

Ile Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp
1475 1480 1485

Ser Lys Asn Ile Leu Glu Phe Tyr Asn Gly Ser Thr Leu Glu Phe
1490 1495 1500

Asn Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys
1505 1510 1515

Asp Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn
1520 1525 1530

Thr Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn
1535 1540 1545

Gln Ala Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser
1550 1555 1560

Ser Tyr Leu Asp Phe Val Lys Asn Ala Asp Gly His His Asn Thr
1565 1570 1575

Ser Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys
1580 1585 1590

Leu Phe Gly Phe Glu Asn Ile Asn Phe Val Val Asp Lys Tyr Phe
1595 1600 1605

Thr Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys
1610 1615 1620

Asp Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr
1625 1630 1635

Ser Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val

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1640 1645 1650

Val Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser
1655 1660 1665

Thr Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg
1670 1675 1680

Tyr Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu
1685 1690 1695

Ile Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu
1700 1705 1710

Ile Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile
1715 1720 1725

Asn Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly
1730 1735 1740

Ser Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys
1745 1750 1755

Ile Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln
1760 1765 1770

Ser Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu
1775 1780 1785

Ser Leu Val Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu
1790 1795 1800

Asn Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn
1805 1810 1815

Lys Thr Tyr Tyr Tyr Asp Glu Ala Ser Lys Leu Val Lys Gly Leu
1820 1825 1830

Ile Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Ser

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1835 1840 1845

Asn Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr
1850 1855 1860

Phe Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile
1865 1870 1875

Asn Gly Lys His Phe Tyr Phe Asn Asn Asn Gly Val Met Gln Leu
1880 1885 1890

Gly Val Phe Lys Gly Pro Asp Arg Phe Glu Tyr Phe Ala Pro Ala
1895 1900 1905

Asn Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln
1910 1915 1920

Ser Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn
1925 1930 1935

Asp Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys
1940 1945 1950

Tyr Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln
1955 1960 1965

Val Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile
1970 1975 1980

Ile Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe
1985 1990 1995

Asp Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp
2000 2005 2010

Gly Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly
2015 2020 2025

Val Phe Ser Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn

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2030 2035 2040

Thr Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
2045 2050 2055

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
2060 2065 2070

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr
2075 2080 2085

Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr
2090 2095 2100

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Val
2105 2110 2115

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2120 2125 2130

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
2135 2140 2145

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2150 2155 2160

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2165 2170 2175

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Lys
2180 2185 2190

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Ala Ser Asp Ser
2195 2200 2205

Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Asn Asn Ala Ile Ala Ala Thr His Leu Tyr Thr Ile

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2225 2230 2235

Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn
2240 2245 2250

Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn
2255 2260 2265

Asn Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly
2270 2275 2280

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu
2285 2290 2295

Gly Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly
2300 2305 2310

Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp
2315 2320 2325

Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala
2330 2335 2340

Val Ala Val Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr
2345 2350 2355

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2360 2365 2370

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ser Ile Ala Ser
2375 2380 2385

Thr Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr Phe Asn Thr
2390 2395 2400

Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly Phe
2405 2410 2415

Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly

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2420 2425 2430

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2435 2440 2445

Lys Tyr Tyr Phe Ala Ser Asp Ser Lys Ala Val Thr Gly Leu Arg
2450 2455 2460

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu
2465 2470 2475

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2480 2485 2490

Asn Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn
2495 2500 2505

Asp Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly
2510 2515 2520

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2525 2530 2535

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2540 2545 2550

Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn
2555 2560 2565

Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Arg Arg Tyr
2570 2575 2580

Tyr Phe Glu Pro Asn Thr Ala Ile Gly Ala Asn Gly Tyr Lys Ile
2585 2590 2595

Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile
2600 2605 2610

Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala

2615 2620 2625

Asn Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg Tyr Gln
2630 2635 2640

Asn Arg Phe Leu His Leu Leu Gly Asn Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Asn Met
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly
2705 2710

<210> 285
<211> 2709
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<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 285

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
50 55 60

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```
Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Ala Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270
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Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Ala Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Pro Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

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```
Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Gln Ile Asn Ser Leu Ala Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
    530                 535                 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545                 550                 555                 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
        595                 600                 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
    610                 615                 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625                 630                 635                 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
                645                 650                 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
            660                 665                 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
        675                 680                 685
```

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```
Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
    690                 695                 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705                 710                 715                 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser Ile
                725                 730                 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
            740                 745                 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
        755                 760                 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
    770                 775                 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785                 790                 795                 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
                805                 810                 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
            820                 825                 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
        835                 840                 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
    850                 855                 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865                 870                 875                 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
                885                 890                 895
```

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```
Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
            900                 905                 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
        915                 920                 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
    930                 935                 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945                 950                 955                 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
                965                 970                 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
            980                 985                 990

Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Tyr Asp Ser  Ile Gln Leu
        995                 1000                1005

Val Asn  Leu Ile Ser Asn Ala  Val Asn Asp Thr Ile  Asn Val Leu
    1010                1015                1020

Pro Thr  Ile Thr Glu Gly Ile  Pro Ile Val Ser Thr  Ile Leu Asp
    1025                1030                1035

Gly Ile  Asn Leu Gly Ala Ala  Ile Lys Glu Leu Leu  Asp Glu His
    1040                1045                1050

Asp Pro  Leu Leu Lys Lys Glu  Leu Glu Ala Lys Val  Gly Val Leu
    1055                1060                1065

Ala Ile  Asn Met Ser Leu Ser  Ile Ala Ala Thr Val  Ala Ser Ile
    1070                1075                1080

Val Gly  Ile Gly Ala Glu Val  Thr Ile Phe Leu Leu  Pro Ile Ala
    1085                1090                1095
```

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```
Gly Ile  Ser Ala Gly Ile Pro  Ser Leu Val Asn Asn  Glu Leu Ile
    1100                1105                1110

Leu His  Asp Lys Ala Thr Ser  Val Val Asn Tyr Phe  Asn His Leu
    1115                1120                1125

Ser Glu  Ser Lys Glu Tyr Gly  Pro Leu Lys Thr Glu  Asp Asp Lys
    1130                1135                1140

Ile Leu  Val Pro Ile Asp Asp  Leu Val Ile Ser Glu  Ile Asp Phe
    1145                1150                1155

Asn Asn  Asn Ser Ile Lys Leu  Gly Thr Cys Asn Ile  Leu Ala Met
    1160                1165                1170

Glu Gly  Gly Ser Gly His Thr  Val Thr Gly Asn Ile  Asp His Phe
    1175                1180                1185

Phe Ser  Ser Pro Tyr Ile Ser  Ser His Ile Pro Ser  Leu Ser Val
    1190                1195                1200

Tyr Ser  Ala Ile Gly Ile Lys  Thr Glu Asn Leu Asp  Phe Ser Lys
    1205                1210                1215

Lys Ile  Met Met Leu Pro Asn  Ala Pro Ser Arg Val  Phe Trp Trp
    1220                1225                1230

Glu Thr  Gly Ala Val Pro Gly  Leu Arg Ser Leu Glu  Asn Asn Gly
    1235                1240                1245

Thr Lys  Leu Leu Asp Ser Ile  Arg Asp Leu Tyr Pro  Gly Lys Phe
    1250                1255                1260

Tyr Trp  Arg Phe Tyr Ala Phe  Phe Asp Tyr Ala Ile  Thr Thr Leu
    1265                1270                1275

Lys Pro  Val Tyr Glu Asp Thr  Asn Thr Lys Ile Lys  Leu Asp Lys
    1280                1285                1290
```

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Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asp Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Met Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Asn Leu Ile
1355 1360 1365

Glu Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

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Lys Asn Ile Leu Glu Phe Tyr Asn Gly Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asn Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

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```
Ile Asn  Lys Val Leu Ile Ala  Pro Asp Leu Tyr Thr  Ser Leu Ile
    1685                1690                1695

Asn Ile  Asn Thr Asn Tyr Tyr  Ser Asn Glu Tyr Tyr  Pro Glu Ile
    1700                1705                1710

Ile Val  Leu Asn Pro Asn Thr  Phe His Lys Lys Val  Asn Ile Asn
    1715                1720                1725

Leu Asp  Ser Ser Ser Phe Glu  Tyr Lys Trp Ser Thr  Glu Gly Ser
    1730                1735                1740

Asp Phe  Ile Leu Val Arg Tyr  Leu Glu Glu Ser Asn  Lys Lys Ile
    1745                1750                1755

Leu Gln  Lys Ile Arg Ile Lys  Gly Ile Leu Ser Asn  Thr Gln Ser
    1760                1765                1770

Phe Asn  Lys Met Ser Ile Asp  Phe Lys Asp Ile Lys  Lys Leu Ser
    1775                1780                1785

Leu Gly  Tyr Ile Met Ser Asn  Phe Lys Ser Phe Asn  Ser Glu Asn
    1790                1795                1800

Glu Leu  Asp Arg Asp His Leu  Gly Phe Lys Ile Ile  Asp Asn Lys
    1805                1810                1815

Thr Tyr  Tyr Tyr Asp Glu Asp  Ser Lys Leu Val Lys  Gly Leu Ile
    1820                1825                1830

Asn Ile  Asn Asn Ser Leu Phe  Tyr Phe Asp Pro Ile  Glu Ser Asn
    1835                1840                1845

Leu Val  Thr Gly Trp Gln Thr  Ile Asn Gly Lys Lys  Tyr Tyr Phe
    1850                1855                1860

Asp Ile  Asn Thr Gly Ala Ala  Ser Thr Ser Tyr Lys  Ile Ile Asn
    1865                1870                1875
```

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Gly Lys His Phe Tyr Phe Asn Asn Asn Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

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```
Lys Ala  Val Thr Gly Trp Gln  Thr Ile Asp Ser Lys  Lys Tyr Tyr
    2075                2080                2085

Phe Asn  Thr Asn Thr Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile
    2090                2095                2100

Asp Gly  Lys Lys Tyr Tyr Phe  Asn Thr Asn Thr Ala  Glu Ala Ala
    2105                2110                2115

Thr Gly  Trp Gln Thr Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr
    2120                2125                2130

Asn Thr  Ser Ile Ala Ser Thr  Gly Tyr Thr Ile Ile  Asn Gly Lys
    2135                2140                2145

Tyr Phe  Tyr Phe Asn Thr Asp  Gly Ile Met Gln Ile  Gly Val Phe
    2150                2155                2160

Lys Val  Pro Asn Gly Phe Glu  Tyr Phe Ala Pro Ala  Asn Thr His
    2165                2170                2175

Asn Asn  Asn Ile Glu Gly Gln  Ala Ile Leu Tyr Gln  Asn Lys Phe
    2180                2185                2190

Leu Thr  Leu Asn Gly Lys Lys  Tyr Tyr Phe Gly Ser  Asp Ser Lys
    2195                2200                2205

Ala Ile  Thr Gly Trp Gln Thr  Ile Asp Gly Lys Lys  Tyr Tyr Phe
    2210                2215                2220

Asn Pro  Asn Asn Ala Ile Ala  Ala Thr His Leu Cys  Thr Ile Asn
    2225                2230                2235

Asn Asp  Lys Tyr Tyr Phe Ser  Tyr Asp Gly Ile Leu  Gln Asn Gly
    2240                2245                2250

Tyr Ile  Thr Ile Glu Arg Asn  Asn Phe Tyr Phe Asp  Ala Asn Asn
    2255                2260                2265
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Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Ser Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Val
2330 2335 2340

Ala Val Thr Gly Trp Gln Thr Ile Asp Gly Glu Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Arg Tyr Tyr Phe Asn Thr Asn Thr Tyr Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

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```
Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr Asn Thr  Ala Val Ala
    2465                2470                2475

Val Thr  Gly Trp Gln Thr Ile  Asn Gly Lys Lys Tyr  Tyr Phe Asn
    2480                2485                2490

Thr Asn  Thr Tyr Ile Ala Ser  Thr Gly Tyr Thr Ile  Ile Ser Gly
    2495                2500                2505

Lys His  Phe Tyr Phe Asn Thr  Asp Gly Ile Met Gln  Ile Gly Val
    2510                2515                2520

Phe Lys  Gly Pro Asp Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr
    2525                2530                2535

Asp Ala  Asn Asn Ile Glu Gly  Gln Ala Ile Arg Tyr  Gln Asn Arg
    2540                2545                2550

Phe Leu  Tyr Leu His Asp Asn  Ile Tyr Tyr Phe Gly  Asn Asp Ser
    2555                2560                2565

Lys Ala  Ala Thr Gly Trp Ala  Thr Ile Asp Gly Asn  Arg Tyr Tyr
    2570                2575                2580

Phe Glu  Pro Asn Thr Ala Met  Gly Ala Asn Gly Tyr  Lys Thr Ile
    2585                2590                2595

Asp Asn  Lys Asn Phe Tyr Phe  Arg Asn Gly Leu Pro  Gln Ile Gly
    2600                2605                2610

Val Phe  Lys Gly Pro Asn Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2615                2620                2625

Thr Asp  Ala Asn Asn Ile Asp  Gly Gln Ala Ile Arg  Tyr Gln Asn
    2630                2635                2640

Arg Phe  Leu His Leu Leu Gly  Lys Ile Tyr Tyr Phe  Gly Asn Asn
    2645                2650                2655
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Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Ser Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

<210> 286
<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 286

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Ala Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr

```
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
```

305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Gln Ile Asn Ser Leu Ala Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln

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515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
530 535 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545 550 555 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
565 570 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
580 585 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
595 600 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
610 615 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625 630 635 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
645 650 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
660 665 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
675 680 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
690 695 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705 710 715 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile

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725 730 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
740 745 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
755 760 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
770 775 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785 790 795 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
805 810 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
820 825 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
835 840 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
850 855 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865 870 875 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
885 890 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
900 905 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
915 920 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn

930 935 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945 950 955 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
965 970 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
980 985 990

Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln Leu
995 1000 1005

Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val Leu
1010 1015 1020

Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu Asp
1025 1030 1035

Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu His
1040 1045 1050

Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val Leu
1055 1060 1065

Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser Ile
1070 1075 1080

Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile Ala
1085 1090 1095

Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile
1100 1105 1110

Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu
1115 1120 1125

Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys

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1130 1135 1140

Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asn Gly
1235 1240 1245

Thr Lys Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu

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1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile
1355 1360 1365

Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Gly Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr

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1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn

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1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser

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1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asp Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala

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2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr Tyr Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys

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2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
2330 2335 2340

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly

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2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys

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2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

<210> 287
<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 287

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Ala Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
130 135 140

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Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350
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Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Gln Ile Asn Ser Leu Ala Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
    530                 535                 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545                 550                 555                 560
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Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
        595                 600                 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
    610                 615                 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625                 630                 635                 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
                645                 650                 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
            660                 665                 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
        675                 680                 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
    690                 695                 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705                 710                 715                 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
                725                 730                 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
            740                 745                 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
        755                 760                 765
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```
Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
    770                 775                 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785                 790                 795                 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
                805                 810                 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
            820                 825                 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
        835                 840                 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
    850                 855                 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865                 870                 875                 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
                885                 890                 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
            900                 905                 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
        915                 920                 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
    930                 935                 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945                 950                 955                 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
                965                 970                 975
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Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
            980                 985                 990

Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Tyr Asp Ser  Ile Gln Leu
        995                 1000                1005

Val Asn  Leu Ile Ser Asn Ala  Val Asn Asp Thr Ile  Asn Val Leu
    1010                1015                1020

Pro Thr  Ile Thr Glu Gly Ile  Pro Ile Val Ser Thr  Ile Leu Asp
    1025                1030                1035

Gly Ile  Asn Leu Gly Ala Ala  Ile Lys Glu Leu Leu  Asp Glu His
    1040                1045                1050

Asp Pro  Leu Leu Lys Lys Glu  Leu Glu Ala Lys Val  Gly Val Leu
    1055                1060                1065

Ala Ile  Asn Met Ser Leu Ser  Ile Ala Ala Thr Val  Ala Ser Ile
    1070                1075                1080

Val Gly  Ile Gly Ala Glu Val  Thr Ile Phe Leu Leu  Pro Ile Ala
    1085                1090                1095

Gly Ile  Ser Ala Gly Ile Pro  Ser Leu Val Asn Asn  Glu Leu Ile
    1100                1105                1110

Leu His  Asp Lys Ala Thr Ser  Val Val Asn Tyr Phe  Asn His Leu
    1115                1120                1125

Ser Glu  Ser Lys Lys Tyr Gly  Pro Leu Lys Thr Glu  Asp Asp Lys
    1130                1135                1140

Ile Leu  Val Pro Ile Asp Asp  Leu Val Ile Ser Glu  Ile Asp Phe
    1145                1150                1155

Asn Asn  Asn Ser Ile Lys Leu  Gly Thr Cys Asn Ile  Leu Ala Met
    1160                1165                1170
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```
Glu Gly  Gly Ser Gly His Thr  Val Thr Gly Asn Ile  Asp His Phe
    1175                1180                1185

Phe Ser  Ser Pro Ser Ile Ser  Ser His Ile Pro Ser  Leu Ser Ile
    1190                1195                1200

Tyr Ser  Ala Ile Gly Ile Glu  Thr Glu Asn Leu Asp  Phe Ser Lys
    1205                1210                1215

Lys Ile  Met Met Leu Pro Asn  Ala Pro Ser Arg Val  Phe Trp Trp
    1220                1225                1230

Glu Thr  Gly Ala Val Pro Gly  Leu Arg Ser Leu Glu  Asn Asp Gly
    1235                1240                1245

Thr Arg  Leu Leu Asp Ser Ile  Arg Asp Leu Tyr Pro  Gly Lys Phe
    1250                1255                1260

Tyr Trp  Arg Phe Tyr Ala Phe  Phe Asp Tyr Ala Ile  Thr Thr Leu
    1265                1270                1275

Lys Pro  Val Tyr Glu Asp Thr  Asn Ile Lys Ile Lys  Leu Asp Lys
    1280                1285                1290

Asp Thr  Arg Asn Phe Ile Met  Pro Thr Ile Thr Thr  Asn Glu Ile
    1295                1300                1305

Arg Asn  Lys Leu Ser Tyr Ser  Phe Asp Gly Ala Gly  Gly Thr Tyr
    1310                1315                1320

Ser Leu  Leu Leu Ser Ser Tyr  Pro Ile Ser Thr Asn  Ile Asn Leu
    1325                1330                1335

Ser Lys  Asp Asp Leu Trp Ile  Phe Asn Ile Asp Asn  Glu Val Arg
    1340                1345                1350

Glu Ile  Ser Ile Glu Asn Gly  Thr Ile Lys Lys Gly  Lys Leu Ile
    1355                1360                1365
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Lys Asp  Val Leu Ser Lys Ile  Asp Ile Asn Lys Asn  Lys Leu Ile
    1370                1375                1380

Ile Gly  Asn Gln Thr Ile Asp  Phe Ser Gly Asp Ile  Asp Asn Lys
    1385                1390                1395

Asp Arg  Tyr Ile Phe Leu Thr  Cys Glu Leu Asp Asp  Lys Ile Ser
    1400                1405                1410

Leu Ile  Ile Glu Ile Asn Leu  Val Ala Lys Ser Tyr  Ser Leu Leu
    1415                1420                1425

Leu Ser  Gly Asp Lys Asn Tyr  Leu Ile Ser Asn Leu  Ser Asn Thr
    1430                1435                1440

Ile Glu  Lys Ile Asn Thr Leu  Gly Leu Asp Ser Lys  Asn Ile Ala
    1445                1450                1455

Tyr Asn  Tyr Thr Asp Glu Ser  Asn Asn Lys Tyr Phe  Gly Ala Ile
    1460                1465                1470

Ser Lys  Thr Ser Gln Lys Ser  Ile Ile His Tyr Lys  Lys Asp Ser
    1475                1480                1485

Lys Asn  Ile Leu Glu Phe Tyr  Asn Asp Ser Thr Leu  Glu Phe Asn
    1490                1495                1500

Ser Lys  Asp Phe Ile Ala Glu  Asp Ile Asn Val Phe  Met Lys Asp
    1505                1510                1515

Asp Ile  Asn Thr Ile Thr Gly  Lys Tyr Tyr Val Asp  Asn Asn Thr
    1520                1525                1530

Asp Lys  Ser Ile Asp Phe Ser  Ile Ser Leu Val Ser  Lys Asn Gln
    1535                1540                1545

Val Lys  Val Asn Gly Leu Tyr  Leu Asn Glu Ser Val  Tyr Ser Ser
    1550                1555                1560
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Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

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Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

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```
Tyr Phe  Asn Pro Asn Asn Ala  Ile Ala Ala Val Gly  Leu Gln Val
    1955                1960                1965

Ile Asp  Asn Asn Lys Tyr Tyr  Phe Asn Pro Asp Thr  Ala Ile Ile
    1970                1975                1980

Ser Lys  Gly Trp Gln Thr Val  Asn Gly Ser Arg Tyr  Tyr Phe Asp
    1985                1990                1995

Thr Asp  Thr Ala Ile Ala Phe  Asn Gly Tyr Lys Thr  Ile Asp Gly
    2000                2005                2010

Lys His  Phe Tyr Phe Asp Ser  Asp Cys Val Val Lys  Ile Gly Val
    2015                2020                2025

Phe Ser  Thr Ser Asn Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr
    2030                2035                2040

Tyr Asn  Asn Asn Ile Glu Gly  Gln Ala Ile Val Tyr  Gln Ser Lys
    2045                2050                2055

Phe Leu  Thr Leu Asn Gly Lys  Lys Tyr Tyr Phe Asp  Asn Asn Ser
    2060                2065                2070

Lys Ala  Val Thr Gly Trp Gln  Thr Ile Asp Ser Lys  Lys Tyr Tyr
    2075                2080                2085

Phe Asn  Thr Asn Thr Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile
    2090                2095                2100

Asp Gly  Lys Lys Tyr Tyr Phe  Asn Thr Asn Thr Ala  Glu Ala Ala
    2105                2110                2115

Thr Gly  Trp Gln Thr Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr
    2120                2125                2130

Asn Thr  Ala Ile Ala Ser Thr  Gly Tyr Thr Ile Ile  Asn Gly Lys
    2135                2140                2145
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His Phe  Tyr Phe Asn Thr Asp  Gly Ile Met Gln Ile  Gly Val Phe
    2150                2155                2160

Lys Gly  Pro Asn Gly Phe Glu  Tyr Phe Ala Pro Ala  Asn Thr Asp
    2165                2170                2175

Ala Asn  Asn Ile Glu Gly Gln  Ala Ile Leu Tyr Gln  Asn Glu Phe
    2180                2185                2190

Leu Thr  Leu Asn Gly Lys Lys  Tyr Tyr Phe Gly Ser  Asp Ser Lys
    2195                2200                2205

Ala Val  Thr Gly Trp Arg Ile  Ile Asn Asn Lys Lys  Tyr Tyr Phe
    2210                2215                2220

Asn Pro  Asn Asn Ala Ile Ala  Ala Ile His Leu Cys  Thr Ile Asn
    2225                2230                2235

Asn Asp  Lys Tyr Tyr Phe Ser  Tyr Asp Gly Ile Leu  Gln Asn Gly
    2240                2245                2250

Tyr Ile  Thr Ile Glu Arg Asn  Asn Phe Tyr Phe Asp  Ala Asn Asn
    2255                2260                2265

Glu Ser  Lys Met Val Thr Gly  Val Phe Lys Gly Pro  Asn Gly Phe
    2270                2275                2280

Glu Tyr  Phe Ala Pro Ala Asn  Thr His Asn Asn Asn  Ile Glu Gly
    2285                2290                2295

Gln Ala  Ile Val Tyr Gln Asn  Lys Phe Leu Thr Leu  Asn Gly Lys
    2300                2305                2310

Lys Tyr  Tyr Phe Asp Asn Asp  Ser Lys Ala Val Thr  Gly Trp Gln
    2315                2320                2325

Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn Leu Asn  Thr Ala Glu
    2330                2335                2340
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Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

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Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

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<211> 2709
<212> PRT

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<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 288

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            20                  25                  30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Ala Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Val Asn Tyr Tyr Lys Ser Gln Ile
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180 185 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
195 200 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
210 215 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225 230 235 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Ala Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln

385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Gln Ile Asn Ser Leu Ala Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
530 535 540

Asn Glu Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545 550 555 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
565 570 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
580 585 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile

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595 600 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
610 615 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625 630 635 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
645 650 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
660 665 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
675 680 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
690 695 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705 710 715 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser Ile
725 730 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
740 745 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
755 760 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
770 775 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785 790 795 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Thr Ser Val Ser Pro

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805 810 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
820 825 830

Val Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
835 840 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
850 855 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865 870 875 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
885 890 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
900 905 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
915 920 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
930 935 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945 950 955 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
965 970 975

Asp Leu Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
980 985 990

Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln Leu
995 1000 1005

Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val Leu

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1010 1015 1020

Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu Asp
1025 1030 1035

Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu His
1040 1045 1050

Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val Leu
1055 1060 1065

Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser Ile
1070 1075 1080

Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile Ala
1085 1090 1095

Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile
1100 1105 1110

Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu
1115 1120 1125

Ser Glu Ser Lys Glu Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys
1130 1135 1140

Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ala Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Lys Thr Glu Asn Leu Asp Phe Ser Lys

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1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asn Gly
1235 1240 1245

Thr Lys Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile
1355 1360 1365

Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser

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1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Gly Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Ala Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ala Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Val Asp Lys Tyr Phe Thr

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1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Val Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn

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1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Ala Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Ser Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asn Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Arg Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp

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1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Val Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Lys Phe

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2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Ala Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Thr His Leu Tyr Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Val
2330 2335 2340

Ala Val Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ser Ile Ala Ser Thr

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2375 2380 2385

Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Ala Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala
2465 2470 2475

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Asp
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Arg Arg Tyr Tyr

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2570 2575 2580

Phe Glu Pro Asn Thr Ala Ile Gly Ala Asn Gly Tyr Lys Ile Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Asn Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Asn Met Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

<210> 289
<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 289

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

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Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
            20                  25                  30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Ala Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220
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Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430
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```
Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Gln Ile Asn Ser Leu Ala Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
    530                 535                 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545                 550                 555                 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
        595                 600                 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
    610                 615                 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625                 630                 635                 640
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Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
                645                 650                 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
            660                 665                 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
        675                 680                 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
    690                 695                 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705                 710                 715                 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
                725                 730                 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
            740                 745                 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
        755                 760                 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
    770                 775                 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785                 790                 795                 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
                805                 810                 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
            820                 825                 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
        835                 840                 845
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```
Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
    850                 855                 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865                 870                 875                 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
                885                 890                 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
            900                 905                 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
        915                 920                 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
    930                 935                 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945                 950                 955                 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
                965                 970                 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
            980                 985                 990

Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Tyr Asp Ser  Ile Gln Leu
        995                 1000                1005

Val Asn  Leu Ile Ser Asn Ala  Val Asn Asp Thr Ile  Asn Val Leu
    1010                1015                1020

Pro Thr  Ile Thr Glu Gly Ile  Pro Ile Val Ser Thr  Ile Leu Asp
    1025                1030                1035

Gly Ile  Asn Leu Gly Ala Ala  Ile Lys Glu Leu Leu  Asp Glu His
    1040                1045                1050
```

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```
Asp Pro  Leu Leu Lys Lys Glu  Leu Glu Ala Lys Val  Gly Val Leu
    1055                1060                1065

Ala Ile  Asn Met Ser Leu Ser  Ile Ala Ala Thr Val  Ala Ser Ile
    1070                1075                1080

Val Gly  Ile Gly Ala Glu Val  Thr Ile Phe Leu Leu  Pro Ile Ala
    1085                1090                1095

Gly Ile  Ser Ala Gly Ile Pro  Ser Leu Val Asn Asn  Glu Leu Ile
    1100                1105                1110

Leu His  Asp Lys Ala Thr Ser  Val Val Asn Tyr Phe  Asn His Leu
    1115                1120                1125

Ser Glu  Ser Lys Lys Tyr Gly  Pro Leu Lys Thr Glu  Asp Asp Lys
    1130                1135                1140

Ile Leu  Val Pro Ile Asp Asp  Leu Val Ile Ser Glu  Ile Asp Phe
    1145                1150                1155

Asn Asn  Asn Ser Ile Lys Leu  Gly Thr Cys Asn Ile  Leu Ala Met
    1160                1165                1170

Glu Gly  Gly Ser Gly His Thr  Val Thr Gly Asn Ile  Asp His Phe
    1175                1180                1185

Phe Ser  Ser Pro Ser Ile Ser  Ser His Ile Pro Ser  Leu Ser Ile
    1190                1195                1200

Tyr Ser  Ala Ile Gly Ile Glu  Thr Glu Asn Leu Asp  Phe Ser Lys
    1205                1210                1215

Lys Ile  Met Met Leu Pro Asn  Ala Pro Ser Arg Val  Phe Trp Trp
    1220                1225                1230

Glu Thr  Gly Ala Val Pro Gly  Leu Arg Ser Leu Glu  Asn Asp Gly
    1235                1240                1245
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```
Thr Arg  Leu Leu Asp Ser Ile  Arg Asp Leu Tyr Pro  Gly Lys Phe
    1250                1255                1260

Tyr Trp  Arg Phe Tyr Ala Phe  Phe Asp Tyr Ala Ile  Thr Thr Leu
    1265                1270                1275

Lys Pro  Val Tyr Glu Asp Thr  Asn Ile Lys Ile Lys  Leu Asp Lys
    1280                1285                1290

Asp Thr  Arg Asn Phe Ile Met  Pro Thr Ile Thr Thr  Asn Glu Ile
    1295                1300                1305

Arg Asn  Lys Leu Ser Tyr Ser  Phe Asp Gly Ala Gly  Gly Thr Tyr
    1310                1315                1320

Ser Leu  Leu Leu Ser Ser Tyr  Pro Ile Ser Thr Asn  Ile Asn Leu
    1325                1330                1335

Ser Lys  Asp Asp Leu Trp Ile  Phe Asn Ile Asp Asn  Glu Val Arg
    1340                1345                1350

Glu Ile  Ser Ile Glu Asn Gly  Thr Ile Lys Lys Gly  Lys Leu Ile
    1355                1360                1365

Lys Asp  Val Leu Ser Lys Ile  Asp Ile Asn Lys Asn  Lys Leu Ile
    1370                1375                1380

Ile Gly  Asn Gln Thr Ile Asp  Phe Ser Gly Asp Ile  Asp Asn Lys
    1385                1390                1395

Asp Arg  Tyr Ile Phe Leu Thr  Cys Glu Leu Asp Asp  Lys Ile Ser
    1400                1405                1410

Leu Ile  Ile Glu Ile Asn Leu  Val Ala Lys Ser Tyr  Ser Leu Leu
    1415                1420                1425

Leu Ser  Gly Asp Lys Asn Tyr  Leu Ile Ser Asn Leu  Ser Asn Thr
    1430                1435                1440
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```
Ile Glu  Lys Ile Asn Thr Leu  Gly Leu Asp Ser Lys  Asn Ile Ala
    1445                1450                1455

Tyr Asn  Tyr Thr Asp Glu Ser  Asn Asn Lys Tyr Phe  Gly Ala Ile
    1460                1465                1470

Ser Lys  Thr Ser Gln Lys Ser  Ile Ile His Tyr Lys  Lys Asp Ser
    1475                1480                1485

Lys Asn  Ile Leu Glu Phe Tyr  Asn Asp Ser Thr Leu  Glu Phe Asn
    1490                1495                1500

Ser Lys  Asp Phe Ile Ala Glu  Asp Ile Asn Val Phe  Met Lys Asp
    1505                1510                1515

Asp Ile  Asn Thr Ile Thr Gly  Lys Tyr Tyr Val Asp  Asn Asn Thr
    1520                1525                1530

Asp Lys  Ser Ile Asp Phe Ser  Ile Ser Leu Val Ser  Lys Asn Gln
    1535                1540                1545

Val Lys  Val Asn Gly Leu Tyr  Leu Asn Glu Ser Val  Tyr Ser Ser
    1550                1555                1560

Tyr Leu  Asp Phe Val Lys Asn  Ser Asp Gly His His  Asn Thr Ser
    1565                1570                1575

Asn Phe  Met Asn Leu Phe Leu  Asp Asn Ile Ser Phe  Trp Lys Leu
    1580                1585                1590

Phe Gly  Phe Glu Asn Ile Asn  Phe Val Ile Asp Lys  Tyr Phe Thr
    1595                1600                1605

Leu Val  Gly Lys Thr Asn Leu  Gly Tyr Val Glu Phe  Ile Cys Asp
    1610                1615                1620

Asn Asn  Lys Asn Ile Asp Ile  Tyr Phe Gly Glu Trp  Lys Thr Ser
    1625                1630                1635
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```
Ser Ser  Lys Ser Thr Ile Phe  Ser Gly Asn Gly Arg  Asn Val Val
    1640                1645                1650

Val Glu  Pro Ile Tyr Asn Pro  Asp Thr Gly Glu Asp  Ile Ser Thr
    1655                1660                1665

Ser Leu  Asp Phe Ser Tyr Glu  Pro Leu Tyr Gly Ile  Asp Arg Tyr
    1670                1675                1680

Ile Asn  Lys Val Leu Ile Ala  Pro Asp Leu Tyr Thr  Ser Leu Ile
    1685                1690                1695

Asn Ile  Asn Thr Asn Tyr Tyr  Ser Asn Glu Tyr Tyr  Pro Glu Ile
    1700                1705                1710

Ile Val  Leu Asn Pro Asn Thr  Phe His Lys Lys Val  Asn Ile Asn
    1715                1720                1725

Leu Asp  Ser Ser Ser Phe Glu  Tyr Lys Trp Ser Thr  Glu Gly Ser
    1730                1735                1740

Asp Phe  Ile Leu Val Arg Tyr  Leu Glu Glu Ser Asn  Lys Lys Ile
    1745                1750                1755

Leu Gln  Lys Ile Arg Ile Lys  Gly Ile Leu Ser Asn  Thr Gln Ser
    1760                1765                1770

Phe Asn  Lys Met Ser Ile Asp  Phe Lys Asp Ile Lys  Lys Leu Ser
    1775                1780                1785

Leu Gly  Tyr Ile Met Ser Asn  Phe Lys Ser Phe Asn  Ser Glu Asn
    1790                1795                1800

Glu Leu  Asp Arg Asp His Leu  Gly Phe Lys Ile Ile  Asp Asn Lys
    1805                1810                1815

Thr Tyr  Tyr Tyr Asp Glu Asp  Ser Lys Leu Val Lys  Gly Leu Ile
    1820                1825                1830
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Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

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Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Lys Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

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```
Asn Pro  Asn Asn Ala Ile Ala  Ala Ile His Leu Cys  Thr Ile Asn
    2225                 2230                 2235

Asn Asp  Lys Tyr Tyr Phe Ser  Tyr Asp Gly Ile Leu  Gln Asn Gly
    2240                 2245                 2250

Tyr Ile  Thr Ile Glu Arg Asn  Asn Phe Tyr Phe Asp  Ala Asn Asn
    2255                 2260                 2265

Glu Ser  Lys Met Val Thr Gly  Val Phe Lys Gly Pro  Asn Gly Phe
    2270                 2275                 2280

Glu Tyr  Phe Ala Pro Ala Asn  Thr Tyr Asn Asn Asn  Ile Glu Gly
    2285                 2290                 2295

Gln Ala  Ile Val Tyr Gln Asn  Lys Phe Leu Thr Leu  Asn Gly Lys
    2300                 2305                 2310

Lys Tyr  Tyr Phe Asp Asn Asp  Ser Lys Ala Val Thr  Gly Trp Gln
    2315                 2320                 2325

Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn Leu Asn  Thr Ala Glu
    2330                 2335                 2340

Ala Ala  Thr Gly Trp Gln Thr  Ile Asp Gly Lys Lys  Tyr Tyr Phe
    2345                 2350                 2355

Asn Leu  Asn Thr Ala Glu Ala  Ala Thr Gly Trp Gln  Thr Ile Asp
    2360                 2365                 2370

Gly Lys  Lys Tyr Tyr Phe Asn  Thr Asn Thr Phe Ile  Ala Ser Thr
    2375                 2380                 2385

Gly Tyr  Thr Ser Ile Asn Gly  Lys His Phe Tyr Phe  Asn Thr Asp
    2390                 2395                 2400

Gly Ile  Met Gln Ile Gly Val  Phe Lys Gly Pro Asn  Gly Phe Glu
    2405                 2410                 2415
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Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

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Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

<210> 290
<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 290

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser

50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Ala Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
130 135 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145 150 155 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
165 170 175

Ile Tyr Asp Arg Gln Lys Arg Phe Val Asn Tyr Tyr Lys Ser Gln Ile
180 185 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
195 200 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
210 215 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225 230 235 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu

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260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Ala Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile

```
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Gln Ile Asn Ser Leu Ala Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
    530                 535                 540

Asn Glu Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545                 550                 555                 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
        595                 600                 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
    610                 615                 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625                 630                 635                 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
                645                 650                 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
            660                 665                 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
```

675 680 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
690 695 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705 710 715 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser Ile
725 730 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
740 745 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
755 760 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
770 775 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785 790 795 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Thr Ser Val Ser Pro
805 810 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
820 825 830

Val Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
835 840 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
850 855 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865 870 875 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr

```
                885                 890                 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
            900                 905                 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
        915                 920                 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
    930                 935                 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945                 950                 955                 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
                965                 970                 975

Asp Leu Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
            980                 985                 990

Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Tyr Asp Ser  Ile Gln Leu
        995                 1000                1005

Val Asn  Leu Ile Ser Asn Ala  Val Asn Asp Thr Ile  Asn Val Leu
    1010                1015                1020

Pro Thr  Ile Thr Glu Gly Ile  Pro Ile Val Ser Thr  Ile Leu Asp
    1025                1030                1035

Gly Ile  Asn Leu Gly Ala Ala  Ile Lys Glu Leu Leu  Asp Glu His
    1040                1045                1050

Asp Pro  Leu Leu Lys Lys Glu  Leu Glu Ala Lys Val  Gly Val Leu
    1055                1060                1065

Ala Ile  Asn Met Ser Leu Ser  Ile Ala Ala Thr Val  Ala Ser Ile
    1070                1075                1080

Val Gly  Ile Gly Ala Glu Val  Thr Ile Phe Leu Leu  Pro Ile Ala
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1085 1090 1095

Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile
1100 1105 1110

Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu
1115 1120 1125

Ser Glu Ser Lys Glu Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys
1130 1135 1140

Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ala Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Lys Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asn Gly
1235 1240 1245

Thr Lys Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys

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1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile
1355 1360 1365

Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser

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1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Gly Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Ala Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ala Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Val Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr

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1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Val Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Ala Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Ser Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn

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1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asn Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Arg Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser

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2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Val Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Lys Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Ala Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Thr His Leu Tyr Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn

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2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Val
2330 2335 2340

Ala Val Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ser Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Ala Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr

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2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala
2465 2470 2475

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Asp
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Arg Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Ile Gly Ala Asn Gly Tyr Lys Ile Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Asn Ile Tyr Tyr Phe Gly Asn Asn

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2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Asn Met Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

<210> 291
<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 291

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

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His Phe Val Ala Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Thr Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300
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Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510
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Gln Ile Asn Ser Leu Ala Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
    530                 535                 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545                 550                 555                 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
        595                 600                 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
    610                 615                 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625                 630                 635                 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
                645                 650                 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
            660                 665                 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
        675                 680                 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
    690                 695                 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705                 710                 715                 720
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Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser Ile
                725                 730                 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
            740                 745                 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
        755                 760                 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
    770                 775                 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785                 790                 795                 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
                805                 810                 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
            820                 825                 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
        835                 840                 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
    850                 855                 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865                 870                 875                 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
                885                 890                 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
            900                 905                 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
        915                 920                 925
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Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
    930                 935                 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945                 950                 955                 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
                965                 970                 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
            980                 985                 990

Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Tyr Asp Ser  Ile Gln Leu
        995                 1000                1005

Val Asn  Leu Ile Ser Asn Ala  Val Asn Asp Thr Ile  Asn Val Leu
    1010                1015                1020

Pro Thr  Ile Thr Glu Gly Ile  Pro Ile Val Ser Thr  Ile Leu Asp
    1025                1030                1035

Gly Ile  Asn Leu Gly Ala Ala  Ile Lys Glu Leu Leu  Asp Glu His
    1040                1045                1050

Asp Pro  Leu Leu Lys Lys Glu  Leu Glu Ala Lys Val  Gly Val Leu
    1055                1060                1065

Ala Ile  Asn Met Ser Leu Ser  Ile Ala Ala Thr Val  Ala Ser Ile
    1070                1075                1080

Val Gly  Ile Gly Ala Glu Val  Thr Ile Phe Leu Leu  Pro Ile Ala
    1085                1090                1095

Gly Ile  Ser Ala Gly Ile Pro  Ser Leu Val Asn Asn  Glu Leu Ile
    1100                1105                1110

Leu His  Asp Lys Ala Thr Ser  Val Val Asn Tyr Phe  Asn His Leu
    1115                1120                1125
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Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys
1130 1135 1140

Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Tyr Ile Ser Ser His Ile Pro Ser Leu Ser Val
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Lys Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly
1235 1240 1245

Thr Lys Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Thr Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asp Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

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```
Ser Leu  Leu Leu Ser Ser Tyr  Pro Ile Ser Met Asn  Ile Asn Leu
    1325                1330                1335

Ser Lys  Asp Asp Leu Trp Ile  Phe Asn Ile Asp Asn  Glu Val Arg
    1340                1345                1350

Glu Ile  Ser Ile Glu Asn Gly  Thr Ile Lys Lys Gly  Asn Leu Ile
    1355                1360                1365

Glu Asp  Val Leu Ser Lys Ile  Asp Ile Asn Lys Asn  Lys Leu Ile
    1370                1375                1380

Ile Gly  Asn Gln Thr Ile Asp  Phe Ser Gly Asp Ile  Asp Asn Lys
    1385                1390                1395

Asp Arg  Tyr Ile Phe Leu Thr  Cys Glu Leu Asp Asp  Lys Ile Ser
    1400                1405                1410

Leu Ile  Ile Glu Ile Asn Leu  Val Ala Lys Ser Tyr  Ser Leu Leu
    1415                1420                1425

Leu Ser  Gly Asp Lys Asn Tyr  Leu Ile Ser Asn Leu  Ser Asn Thr
    1430                1435                1440

Ile Glu  Lys Ile Asn Thr Leu  Gly Leu Asp Ser Lys  Asn Ile Ala
    1445                1450                1455

Tyr Asn  Tyr Thr Asp Glu Ser  Asn Asn Lys Tyr Phe  Gly Ala Ile
    1460                1465                1470

Ser Lys  Thr Ser Gln Lys Ser  Ile Ile His Tyr Lys  Lys Asp Ser
    1475                1480                1485

Lys Asn  Ile Leu Glu Phe Tyr  Asn Gly Ser Thr Leu  Glu Phe Asn
    1490                1495                1500

Ser Lys  Asp Phe Ile Ala Glu  Asp Ile Asn Val Phe  Met Lys Asp
    1505                1510                1515
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Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asn Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Leu
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

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Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Ser Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Ser Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asn Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

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Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

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Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Lys Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Ile Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Thr His Leu Cys Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

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```
Gln Ala  Ile Val Tyr Gln Asn  Lys Phe Leu Thr Leu  Asn Gly Lys
    2300                2305                2310

Lys Tyr  Tyr Phe Asp Asn Asp  Ser Lys Ala Val Thr  Gly Trp Gln
    2315                2320                2325

Thr Ile  Asp Ser Lys Lys Tyr  Tyr Phe Asn Leu Asn  Thr Ala Val
    2330                2335                2340

Ala Val  Thr Gly Trp Gln Thr  Ile Asp Gly Glu Lys  Tyr Tyr Phe
    2345                2350                2355

Asn Leu  Asn Thr Ala Glu Ala  Ala Thr Gly Trp Gln  Thr Ile Asp
    2360                2365                2370

Gly Lys  Arg Tyr Tyr Phe Asn  Thr Asn Thr Tyr Ile  Ala Ser Thr
    2375                2380                2385

Gly Tyr  Thr Ile Ile Asn Gly  Lys His Phe Tyr Phe  Asn Thr Asp
    2390                2395                2400

Gly Ile  Met Gln Ile Gly Val  Phe Lys Gly Pro Asp  Gly Phe Glu
    2405                2410                2415

Tyr Phe  Ala Pro Ala Asn Thr  His Asn Asn Asn Ile  Glu Gly Gln
    2420                2425                2430

Ala Ile  Leu Tyr Gln Asn Lys  Phe Leu Thr Leu Asn  Gly Lys Lys
    2435                2440                2445

Tyr Tyr  Phe Gly Ser Asp Ser  Lys Ala Val Thr Gly  Leu Arg Thr
    2450                2455                2460

Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr Asn Thr  Ala Val Ala
    2465                2470                2475

Val Thr  Gly Trp Gln Thr Ile  Asn Gly Lys Lys Tyr  Tyr Phe Asn
    2480                2485                2490
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Thr Asn Thr Tyr Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asp Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Ala Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Asn Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

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Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

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<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

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Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Ala Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val

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    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Thr Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
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340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Gln Ile Asn Ser Leu Ala Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
530 535 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu

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545                 550                 555                 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
        595                 600                 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
    610                 615                 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625                 630                 635                 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
                645                 650                 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
            660                 665                 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
        675                 680                 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
    690                 695                 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705                 710                 715                 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser Ile
                725                 730                 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
            740                 745                 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
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        755                 760                 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
    770                 775                 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785                 790                 795                 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
                805                 810                 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
            820                 825                 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
        835                 840                 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
    850                 855                 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865                 870                 875                 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
                885                 890                 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
            900                 905                 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
        915                 920                 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
    930                 935                 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945                 950                 955                 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
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                965                 970                 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
            980                 985                 990

Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Tyr Asp Ser  Ile Gln Leu
        995                 1000                1005

Val Asn  Leu Ile Ser Asn Ala  Val Asn Asp Thr Ile  Asn Val Leu
    1010                1015                1020

Pro Thr  Ile Thr Glu Gly Ile  Pro Ile Val Ser Thr  Ile Leu Asp
    1025                1030                1035

Gly Ile  Asn Leu Gly Ala Ala  Ile Lys Glu Leu Leu  Asp Glu His
    1040                1045                1050

Asp Pro  Leu Leu Lys Lys Glu  Leu Glu Ala Lys Val  Gly Val Leu
    1055                1060                1065

Ala Ile  Asn Met Ser Leu Ser  Ile Ala Ala Thr Val  Ala Ser Ile
    1070                1075                1080

Val Gly  Ile Gly Ala Glu Val  Thr Ile Phe Leu Leu  Pro Ile Ala
    1085                1090                1095

Gly Ile  Ser Ala Gly Ile Pro  Ser Leu Val Asn Asn  Glu Leu Ile
    1100                1105                1110

Leu His  Asp Lys Ala Thr Ser  Val Val Asn Tyr Phe  Asn His Leu
    1115                1120                1125

Ser Glu  Ser Lys Lys Tyr Gly  Pro Leu Lys Thr Glu  Asp Asp Lys
    1130                1135                1140

Ile Leu  Val Pro Ile Asp Asp  Leu Val Ile Ser Glu  Ile Asp Phe
    1145                1150                1155

Asn Asn  Asn Ser Ile Lys Leu  Gly Thr Cys Asn Ile  Leu Ala Met
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1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Tyr Ile Ser Ser His Ile Pro Ser Leu Ser Val
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Lys Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly
1235 1240 1245

Thr Lys Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Thr Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asp Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Met Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Asn Leu Ile

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1355 1360 1365

Glu Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Gly Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser

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1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asn Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Leu
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile

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1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Ser Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Ser Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asn Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr

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1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys

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2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Lys Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Ile Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Thr His Leu Cys Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Ser Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Val

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2330 2335 2340

Ala Val Thr Gly Trp Gln Thr Ile Asp Gly Glu Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Arg Tyr Tyr Phe Asn Thr Asn Thr Tyr Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Tyr Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr

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2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asp Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Ala Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Asn Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

<210> 293

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<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 293

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Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1               5                  10                  15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
            20                  25                  30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Ala Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Thr Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175
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Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380
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Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Gln Ile Asn Ser Leu Ala Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
    530                 535                 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545                 550                 555                 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590
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```
Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
        595                 600                 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
    610                 615                 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625                 630                 635                 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
                645                 650                 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
            660                 665                 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
        675                 680                 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
    690                 695                 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705                 710                 715                 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser Ile
                725                 730                 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
            740                 745                 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
        755                 760                 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
    770                 775                 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785                 790                 795                 800
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Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
805 810 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
820 825 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
835 840 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
850 855 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865 870 875 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
885 890 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
900 905 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
915 920 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
930 935 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945 950 955 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
965 970 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
980 985 990

Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln Leu
995 1000 1005

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Val Asn  Leu Ile Ser Asn Ala  Val Asn Asp Thr Ile  Asn Val Leu
    1010                1015                1020

Pro Thr  Ile Thr Glu Gly Ile  Pro Ile Val Ser Thr  Ile Leu Asp
    1025                1030                1035

Gly Ile  Asn Leu Gly Ala Ala  Ile Lys Glu Leu Leu  Asp Glu His
    1040                1045                1050

Asp Pro  Leu Leu Lys Lys Glu  Leu Glu Ala Lys Val  Gly Val Leu
    1055                1060                1065

Ala Ile  Asn Met Ser Leu Ser  Ile Ala Ala Thr Val  Ala Ser Ile
    1070                1075                1080

Val Gly  Ile Gly Ala Glu Val  Thr Ile Phe Leu Leu  Pro Ile Ala
    1085                1090                1095

Gly Ile  Ser Ala Gly Ile Pro  Ser Leu Val Asn Asn  Glu Leu Ile
    1100                1105                1110

Leu His  Asp Lys Ala Thr Ser  Val Val Asn Tyr Phe  Asn His Leu
    1115                1120                1125

Ser Glu  Ser Lys Lys Tyr Gly  Pro Leu Lys Thr Glu  Asp Asp Lys
    1130                1135                1140

Ile Leu  Val Pro Ile Asp Asp  Leu Val Ile Ser Glu  Ile Asp Phe
    1145                1150                1155

Asn Asn  Asn Ser Ile Lys Leu  Gly Thr Cys Asn Ile  Leu Ala Met
    1160                1165                1170

Glu Gly  Gly Ser Gly His Thr  Val Thr Gly Asn Ile  Asp His Phe
    1175                1180                1185

Phe Ser  Ser Pro Tyr Ile Ser  Ser His Ile Pro Ser  Leu Ser Val
    1190                1195                1200
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Tyr Ser  Ala Ile Gly Ile Lys  Thr Glu Asn Leu Asp  Phe Ser Lys
    1205                 1210                 1215

Lys Ile  Met Met Leu Pro Asn  Ala Pro Ser Arg Val  Phe Trp Trp
    1220                 1225                 1230

Glu Thr  Gly Ala Val Pro Gly  Leu Arg Ser Leu Glu  Asn Asp Gly
    1235                 1240                 1245

Thr Lys  Leu Leu Asp Ser Ile  Arg Asp Leu Tyr Pro  Gly Lys Phe
    1250                 1255                 1260

Tyr Trp  Arg Phe Tyr Ala Phe  Phe Asp Tyr Ala Ile  Thr Thr Leu
    1265                 1270                 1275

Lys Pro  Val Tyr Glu Asp Thr  Asn Thr Lys Ile Lys  Leu Asp Lys
    1280                 1285                 1290

Asp Thr  Arg Asn Phe Ile Met  Pro Thr Ile Thr Thr  Asp Glu Ile
    1295                 1300                 1305

Arg Asn  Lys Leu Ser Tyr Ser  Phe Asp Gly Ala Gly  Gly Thr Tyr
    1310                 1315                 1320

Ser Leu  Leu Leu Ser Ser Tyr  Pro Ile Ser Met Asn  Ile Asn Leu
    1325                 1330                 1335

Ser Lys  Asp Asp Leu Trp Ile  Phe Asn Ile Asp Asn  Glu Val Arg
    1340                 1345                 1350

Glu Ile  Ser Ile Glu Asn Gly  Thr Ile Lys Lys Gly  Asn Leu Ile
    1355                 1360                 1365

Glu Asp  Val Leu Ser Lys Ile  Asp Ile Asn Lys Asn  Lys Leu Ile
    1370                 1375                 1380

Ile Gly  Asn Gln Thr Ile Asp  Phe Ser Gly Asp Ile  Asp Asn Lys
    1385                 1390                 1395
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Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Gly Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asn Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

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```
Phe Gly  Phe Glu Asn Ile Asn  Phe Val Ile Asp Lys  Tyr Phe Thr
    1595                1600                1605

Leu Val  Gly Lys Thr Asn Leu  Gly Tyr Val Glu Phe  Ile Cys Asp
    1610                1615                1620

Asn Asn  Lys Asn Ile Asp Ile  Tyr Phe Gly Glu Trp  Lys Thr Leu
    1625                1630                1635

Ser Ser  Lys Ser Thr Ile Phe  Ser Gly Asn Gly Arg  Asn Val Val
    1640                1645                1650

Val Glu  Pro Ile Tyr Asn Pro  Asp Thr Gly Glu Asp  Ile Ser Thr
    1655                1660                1665

Ser Leu  Asp Phe Ser Tyr Glu  Pro Leu Tyr Gly Ile  Asp Arg Tyr
    1670                1675                1680

Ile Asn  Lys Val Leu Ile Ala  Pro Asp Leu Tyr Thr  Ser Leu Ile
    1685                1690                1695

Asn Ile  Asn Thr Asn Tyr Tyr  Ser Asn Glu Tyr Tyr  Pro Glu Ile
    1700                1705                1710

Ile Val  Leu Asn Pro Asn Thr  Phe His Lys Lys Val  Asn Ile Asn
    1715                1720                1725

Leu Asp  Ser Ser Ser Phe Glu  Tyr Lys Trp Ser Thr  Glu Gly Ser
    1730                1735                1740

Asp Phe  Ile Leu Val Arg Tyr  Leu Glu Glu Ser Asn  Lys Lys Ile
    1745                1750                1755

Leu Gln  Lys Ile Arg Ile Lys  Gly Ile Leu Ser Asn  Thr Gln Ser
    1760                1765                1770

Phe Asn  Lys Met Ser Ile Asp  Phe Lys Asp Ile Lys  Lys Leu Ser
    1775                1780                1785
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Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Ser Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Ser Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asn Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

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```
Ser Lys  Gly Trp Gln Thr Val  Asn Gly Ser Arg Tyr  Tyr Phe Asp
    1985                1990                1995

Thr Asp  Thr Ala Ile Ala Phe  Asn Gly Tyr Lys Thr  Ile Asp Gly
    2000                2005                2010

Lys His  Phe Tyr Phe Asp Ser  Asp Cys Val Val Lys  Ile Gly Val
    2015                2020                2025

Phe Ser  Gly Ser Asn Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr
    2030                2035                2040

Tyr Asn  Asn Asn Ile Glu Gly  Gln Ala Ile Val Tyr  Gln Ser Lys
    2045                2050                2055

Phe Leu  Thr Leu Asn Gly Lys  Lys Tyr Tyr Phe Asp  Asn Asn Ser
    2060                2065                2070

Lys Ala  Val Thr Gly Trp Gln  Thr Ile Asp Ser Lys  Lys Tyr Tyr
    2075                2080                2085

Phe Asn  Thr Asn Thr Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile
    2090                2095                2100

Asp Gly  Lys Lys Tyr Tyr Phe  Asn Thr Asn Thr Ala  Glu Ala Ala
    2105                2110                2115

Thr Gly  Trp Gln Thr Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr
    2120                2125                2130

Asn Thr  Ser Ile Ala Ser Thr  Gly Tyr Thr Ile Ile  Asn Gly Lys
    2135                2140                2145

His Phe  Tyr Phe Asn Thr Asp  Gly Ile Met Gln Ile  Gly Val Phe
    2150                2155                2160

Lys Gly  Pro Asn Gly Phe Glu  Tyr Phe Ala Pro Ala  Asn Thr Asp
    2165                2170                2175
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Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Lys Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Ile Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Thr His Leu Cys Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Ser Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Val
2330 2335 2340

Ala Val Thr Gly Trp Gln Thr Ile Asp Gly Glu Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

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Gly Lys Arg Tyr Tyr Phe Asn Thr Asn Thr Tyr Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Tyr Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asp Ser
2555 2560 2565

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Lys Ala Ala Thr Gly Trp Ala Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Asn Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

<210> 294
<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 294

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg

```
1               5                   10                  15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
            20                  25                  30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Ala Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
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210 215 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225 230 235 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Ala Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser

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420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Gln Ile Asn Ser Leu Ala Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
530 535 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545 550 555 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
565 570 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
580 585 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
595 600 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
610 615 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg

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625 630 635 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
645 650 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
660 665 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
675 680 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
690 695 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705 710 715 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
725 730 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
740 745 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
755 760 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
770 775 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785 790 795 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
805 810 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
820 825 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile

835 840 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
850 855 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865 870 875 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
885 890 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
900 905 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
915 920 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
930 935 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945 950 955 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
965 970 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
980 985 990

Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln Leu
995 1000 1005

Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val Leu
1010 1015 1020

Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu Asp
1025 1030 1035

Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu His

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1040 1045 1050

Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val Leu
1055 1060 1065

Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser Ile
1070 1075 1080

Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile Ala
1085 1090 1095

Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile
1100 1105 1110

Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu
1115 1120 1125

Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys
1130 1135 1140

Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly

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1235 1240 1245

Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile
1355 1360 1365

Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr

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1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser

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1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile

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1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val

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2015 2020 2025

Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe

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2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
2330 2335 2340

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu

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2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly

2600 2605 2610

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

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Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

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Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Ala Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255
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Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460
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Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Gln Ile Asn Ser Leu Ala Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
    530                 535                 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545                 550                 555                 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
        595                 600                 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
    610                 615                 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625                 630                 635                 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
                645                 650                 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
            660                 665                 670
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Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
675 680 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
690 695 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705 710 715 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
725 730 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
740 745 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
755 760 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
770 775 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785 790 795 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
805 810 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
820 825 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
835 840 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
850 855 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865 870 875 880

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```
Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
                885                 890                 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
            900                 905                 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
        915                 920                 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
    930                 935                 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945                 950                 955                 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
                965                 970                 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
            980                 985                 990

Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Tyr Asp Ser  Ile Gln Leu
        995                 1000                1005

Val Asn  Leu Ile Ser Asn Ala  Val Asn Asp Thr Ile  Asn Val Leu
    1010                1015                1020

Pro Thr  Ile Thr Glu Gly Ile  Pro Ile Val Ser Thr  Ile Leu Asp
    1025                1030                1035

Gly Ile  Asn Leu Gly Ala Ala  Ile Lys Glu Leu Leu  Asp Glu His
    1040                1045                1050

Asp Pro  Leu Leu Lys Lys Glu  Leu Glu Ala Lys Val  Gly Val Leu
    1055                1060                1065

Ala Ile  Asn Met Ser Leu Ser  Ile Ala Ala Thr Val  Ala Ser Ile
    1070                1075                1080
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Val Gly  Ile Gly Ala Glu Val  Thr Ile Phe Leu Leu  Pro Ile Ala
    1085                1090                1095

Gly Ile  Ser Ala Gly Ile Pro  Ser Leu Val Asn Asn  Glu Leu Ile
    1100                1105                1110

Leu His  Asp Lys Ala Thr Ser  Val Val Asn Tyr Phe  Asn His Leu
    1115                1120                1125

Ser Glu  Ser Lys Lys Tyr Gly  Pro Leu Lys Thr Glu  Asp Asp Lys
    1130                1135                1140

Ile Leu  Val Pro Ile Asp Asp  Leu Val Ile Ser Glu  Ile Asp Phe
    1145                1150                1155

Asn Asn  Asn Ser Ile Lys Leu  Gly Thr Cys Asn Ile  Leu Ala Met
    1160                1165                1170

Glu Gly  Gly Ser Gly His Thr  Val Thr Gly Asn Ile  Asp His Phe
    1175                1180                1185

Phe Ser  Ser Pro Ser Ile Ser  Ser His Ile Pro Ser  Leu Ser Ile
    1190                1195                1200

Tyr Ser  Ala Ile Gly Ile Glu  Thr Glu Asn Leu Asp  Phe Ser Lys
    1205                1210                1215

Lys Ile  Met Met Leu Pro Asn  Ala Pro Ser Arg Val  Phe Trp Trp
    1220                1225                1230

Glu Thr  Gly Ala Val Pro Gly  Leu Arg Ser Leu Glu  Asn Asp Gly
    1235                1240                1245

Thr Arg  Leu Leu Asp Ser Ile  Arg Asp Leu Tyr Pro  Gly Lys Phe
    1250                1255                1260

Tyr Trp  Arg Phe Tyr Ala Phe  Phe Asp Tyr Ala Ile  Thr Thr Leu
    1265                1270                1275
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Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile
1355 1360 1365

Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

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Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Val Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

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Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

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Asp Ile  Asn Thr Gly Ala Ala  Leu Thr Ser Tyr Lys  Ile Ile Asn
    1865                1870                1875

Gly Lys  His Phe Tyr Phe Asn  Asn Asp Gly Val Met  Gln Leu Gly
    1880                1885                1890

Val Phe  Lys Gly Pro Asp Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    1895                1900                1905

Thr Gln  Asn Asn Asn Ile Glu  Gly Gln Ala Ile Val  Tyr Gln Ser
    1910                1915                1920

Lys Phe  Leu Thr Leu Asn Gly  Lys Lys Tyr Tyr Phe  Asp Asn Asn
    1925                1930                1935

Ser Lys  Ala Val Thr Gly Trp  Arg Ile Ile Asn Asn  Glu Lys Tyr
    1940                1945                1950

Tyr Phe  Asn Pro Asn Asn Ala  Ile Ala Ala Val Gly  Leu Gln Val
    1955                1960                1965

Ile Asp  Asn Asn Lys Tyr Tyr  Phe Asn Pro Asp Thr  Ala Ile Ile
    1970                1975                1980

Ser Lys  Gly Trp Gln Thr Val  Asn Gly Ser Arg Tyr  Tyr Phe Asp
    1985                1990                1995

Thr Asp  Thr Ala Ile Ala Phe  Asn Gly Tyr Lys Thr  Ile Asp Gly
    2000                2005                2010

Lys His  Phe Tyr Phe Asp Ser  Asp Cys Val Val Lys  Ile Gly Val
    2015                2020                2025

Phe Ser  Thr Ser Asn Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr
    2030                2035                2040

Tyr Asn  Asn Asn Ile Glu Gly  Gln Ala Ile Val Tyr  Gln Ser Lys
    2045                2050                2055
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Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

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Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
2330 2335 2340

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

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Tyr Tyr  Phe Gly Ser Asp Ser  Lys Ala Val Thr Gly  Leu Arg Thr
    2450                 2455                 2460

Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr Asn Thr  Ala Val Ala
    2465                 2470                 2475

Val Thr  Gly Trp Gln Thr Ile  Asn Gly Lys Lys Tyr  Tyr Phe Asn
    2480                 2485                 2490

Thr Asn  Thr Ser Ile Ala Ser  Thr Gly Tyr Thr Ile  Ile Ser Gly
    2495                 2500                 2505

Lys His  Phe Tyr Phe Asn Thr  Asp Gly Ile Met Gln  Ile Gly Val
    2510                 2515                 2520

Phe Lys  Gly Pro Asp Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr
    2525                 2530                 2535

Asp Ala  Asn Asn Ile Glu Gly  Gln Ala Ile Arg Tyr  Gln Asn Arg
    2540                 2545                 2550

Phe Leu  Tyr Leu His Asp Asn  Ile Tyr Tyr Phe Gly  Asn Asn Ser
    2555                 2560                 2565

Lys Ala  Ala Thr Gly Trp Val  Thr Ile Asp Gly Asn  Arg Tyr Tyr
    2570                 2575                 2580

Phe Glu  Pro Asn Thr Ala Met  Gly Ala Asn Gly Tyr  Lys Thr Ile
    2585                 2590                 2595

Asp Asn  Lys Asn Phe Tyr Phe  Arg Asn Gly Leu Pro  Gln Ile Gly
    2600                 2605                 2610

Val Phe  Lys Gly Ser Asn Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2615                 2620                 2625

Thr Asp  Ala Asn Asn Ile Glu  Gly Gln Ala Ile Arg  Tyr Gln Asn
    2630                 2635                 2640
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Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

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Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu

```
                85                  90                  95

His Phe Val Ala Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
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290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln

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            500                 505                 510

Gln Ile Asn Ser Leu Ala Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
    530                 535                 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545                 550                 555                 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
        595                 600                 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
    610                 615                 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625                 630                 635                 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
                645                 650                 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
            660                 665                 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
        675                 680                 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
    690                 695                 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
```

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705                 710                 715                 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
                725                 730                 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
            740                 745                 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
        755                 760                 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
    770                 775                 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785                 790                 795                 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
                805                 810                 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
            820                 825                 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
        835                 840                 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
    850                 855                 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865                 870                 875                 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
                885                 890                 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
            900                 905                 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
```

915 920 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
930 935 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945 950 955 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
965 970 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
980 985 990

Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln Leu
995 1000 1005

Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val Leu
1010 1015 1020

Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu Asp
1025 1030 1035

Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu His
1040 1045 1050

Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val Leu
1055 1060 1065

Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser Ile
1070 1075 1080

Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile Ala
1085 1090 1095

Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile
1100 1105 1110

Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu

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1115 1120 1125

Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys
1130 1135 1140

Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly
1235 1240 1245

Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr

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1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile
1355 1360 1365

Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp

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1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile

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1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn

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1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile

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2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly

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2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
2330 2335 2340

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn

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2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe

2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

<210> 297
<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 297

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Ala Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

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```
Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335
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```
Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Gln Ile Asn Ser Leu Ala Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
    530                 535                 540
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```
Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545                 550                 555                 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
        595                 600                 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
    610                 615                 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625                 630                 635                 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
                645                 650                 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
            660                 665                 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
        675                 680                 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
    690                 695                 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705                 710                 715                 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
                725                 730                 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
            740                 745                 750
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Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
        755   760   765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
    770   775   780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785   790   795   800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
                805   810   815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
            820   825   830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
        835   840   845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
    850   855   860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865   870   875   880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
                885   890   895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
            900   905   910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
        915   920   925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
    930   935   940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945   950   955   960

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Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
                965                 970                 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
            980                 985                 990

Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Tyr Asp Ser  Ile Gln Leu
        995                 1000                1005

Val Asn  Leu Ile Ser Asn Ala  Val Asn Asp Thr Ile  Asn Val Leu
    1010                1015                1020

Pro Thr  Ile Thr Glu Gly Ile  Pro Ile Val Ser Thr  Ile Leu Asp
    1025                1030                1035

Gly Ile  Asn Leu Gly Ala Ala  Ile Lys Glu Leu Leu  Asp Glu His
    1040                1045                1050

Asp Pro  Leu Leu Lys Lys Glu  Leu Glu Ala Lys Val  Gly Val Leu
    1055                1060                1065

Ala Ile  Asn Met Ser Leu Ser  Ile Ala Ala Thr Val  Ala Ser Ile
    1070                1075                1080

Val Gly  Ile Gly Ala Glu Val  Thr Ile Phe Leu Leu  Pro Ile Ala
    1085                1090                1095

Gly Ile  Ser Ala Gly Ile Pro  Ser Leu Val Asn Asn  Glu Leu Ile
    1100                1105                1110

Leu His  Asp Lys Ala Thr Ser  Val Val Asn Tyr Phe  Asn His Leu
    1115                1120                1125

Ser Glu  Ser Lys Lys Tyr Gly  Pro Leu Lys Thr Glu  Asp Asp Lys
    1130                1135                1140

Ile Leu  Val Pro Ile Asp Asp  Leu Val Ile Ser Glu  Ile Asp Phe
    1145                1150                1155
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Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly
1235 1240 1245

Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

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```
Glu Ile  Ser Ile Glu Asn Gly  Thr Ile Lys Lys Gly  Lys Leu Ile
    1355                1360                1365

Lys Asp  Val Leu Ser Lys Ile  Asp Ile Asn Lys Asn  Lys Leu Ile
    1370                1375                1380

Ile Gly  Asn Gln Thr Ile Asp  Phe Ser Gly Asp Ile  Asp Asn Lys
    1385                1390                1395

Asp Arg  Tyr Ile Phe Leu Thr  Cys Glu Leu Asp Asp  Lys Ile Ser
    1400                1405                1410

Leu Ile  Ile Glu Ile Asn Leu  Val Ala Lys Ser Tyr  Ser Leu Leu
    1415                1420                1425

Leu Ser  Gly Asp Lys Asn Tyr  Leu Ile Ser Asn Leu  Ser Asn Thr
    1430                1435                1440

Ile Glu  Lys Ile Asn Thr Leu  Gly Leu Asp Ser Lys  Asn Ile Ala
    1445                1450                1455

Tyr Asn  Tyr Thr Asp Glu Ser  Asn Asn Lys Tyr Phe  Gly Ala Ile
    1460                1465                1470

Ser Lys  Thr Ser Gln Lys Ser  Ile Ile His Tyr Lys  Lys Asp Ser
    1475                1480                1485

Lys Asn  Ile Leu Glu Phe Tyr  Asn Asp Ser Thr Leu  Glu Phe Asn
    1490                1495                1500

Ser Lys  Asp Phe Ile Ala Glu  Asp Ile Asn Val Phe  Met Lys Asp
    1505                1510                1515

Asp Ile  Asn Thr Ile Thr Gly  Lys Tyr Tyr Val Asp  Asn Asn Thr
    1520                1525                1530

Asp Lys  Ser Ile Asp Phe Ser  Ile Ser Leu Val Ser  Lys Asn Gln
    1535                1540                1545
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Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

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Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

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Ser Lys  Ala Val Thr Gly Trp  Arg Ile Ile Asn Asn  Glu Lys Tyr
    1940                1945                1950

Tyr Phe  Asn Pro Asn Asn Ala  Ile Ala Ala Val Gly  Leu Gln Val
    1955                1960                1965

Ile Asp  Asn Asn Lys Tyr Tyr  Phe Asn Pro Asp Thr  Ala Ile Ile
    1970                1975                1980

Ser Lys  Gly Trp Gln Thr Val  Asn Gly Ser Arg Tyr  Tyr Phe Asp
    1985                1990                1995

Thr Asp  Thr Ala Ile Ala Phe  Asn Gly Tyr Lys Thr  Ile Asp Gly
    2000                2005                2010

Lys His  Phe Tyr Phe Asp Ser  Asp Cys Val Val Lys  Ile Gly Val
    2015                2020                2025

Phe Ser  Thr Ser Asn Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr
    2030                2035                2040

Tyr Asn  Asn Asn Ile Glu Gly  Gln Ala Ile Val Tyr  Gln Ser Lys
    2045                2050                2055

Phe Leu  Thr Leu Asn Gly Lys  Lys Tyr Tyr Phe Asp  Asn Asn Ser
    2060                2065                2070

Lys Ala  Val Thr Gly Trp Gln  Thr Ile Asp Ser Lys  Lys Tyr Tyr
    2075                2080                2085

Phe Asn  Thr Asn Thr Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile
    2090                2095                2100

Asp Gly  Lys Lys Tyr Tyr Phe  Asn Thr Asn Thr Ala  Glu Ala Ala
    2105                2110                2115

Thr Gly  Trp Gln Thr Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr
    2120                2125                2130
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Asn Thr  Ala Ile Ala Ser Thr  Gly Tyr Thr Ile Ile  Asn Gly Lys
    2135                2140                2145

His Phe  Tyr Phe Asn Thr Asp  Gly Ile Met Gln Ile  Gly Val Phe
    2150                2155                2160

Lys Gly  Pro Asn Gly Phe Glu  Tyr Phe Ala Pro Ala  Asn Thr Asp
    2165                2170                2175

Ala Asn  Asn Ile Glu Gly Gln  Ala Ile Leu Tyr Gln  Asn Glu Phe
    2180                2185                2190

Leu Thr  Leu Asn Gly Lys Lys  Tyr Tyr Phe Gly Ser  Asp Ser Lys
    2195                2200                2205

Ala Val  Thr Gly Trp Arg Ile  Ile Asn Asn Lys Lys  Tyr Tyr Phe
    2210                2215                2220

Asn Pro  Asn Asn Ala Ile Ala  Ala Ile His Leu Cys  Thr Ile Asn
    2225                2230                2235

Asn Asp  Lys Tyr Tyr Phe Ser  Tyr Asp Gly Ile Leu  Gln Asn Gly
    2240                2245                2250

Tyr Ile  Thr Ile Glu Arg Asn  Asn Phe Tyr Phe Asp  Ala Asn Asn
    2255                2260                2265

Glu Ser  Lys Met Val Thr Gly  Val Phe Lys Gly Pro  Asn Gly Phe
    2270                2275                2280

Glu Tyr  Phe Ala Pro Ala Asn  Thr His Asn Asn Asn  Ile Glu Gly
    2285                2290                2295

Gln Ala  Ile Val Tyr Gln Asn  Lys Phe Leu Thr Leu  Asn Gly Lys
    2300                2305                2310

Lys Tyr  Tyr Phe Asp Asn Asp  Ser Lys Ala Val Thr  Gly Trp Gln
    2315                2320                2325
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Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
2330 2335 2340

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

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Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

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<210> 298
<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 298

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Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1               5                  10                  15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
            20                  25                  30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Ala Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
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                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Pro Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
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370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Gln Ile Asn Ser Leu Ala Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
530 535 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545 550 555 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
565 570 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr

580 585 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
595 600 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
610 615 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625 630 635 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
645 650 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
660 665 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
675 680 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
690 695 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705 710 715 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser Ile
725 730 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
740 745 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
755 760 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
770 775 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser

785 790 795 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
805 810 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
820 825 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
835 840 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
850 855 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865 870 875 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
885 890 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
900 905 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
915 920 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
930 935 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945 950 955 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
965 970 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
980 985 990

Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln Leu

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995 1000 1005

Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val Leu
1010 1015 1020

Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu Asp
1025 1030 1035

Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu His
1040 1045 1050

Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val Leu
1055 1060 1065

Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser Ile
1070 1075 1080

Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile Ala
1085 1090 1095

Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile
1100 1105 1110

Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu
1115 1120 1125

Ser Glu Ser Lys Glu Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys
1130 1135 1140

Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Tyr Ile Ser Ser His Ile Pro Ser Leu Ser Val

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1190 1195 1200

Tyr Ser Ala Ile Gly Ile Lys Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asn Gly
1235 1240 1245

Thr Lys Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Thr Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asp Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Met Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Asn Leu Ile
1355 1360 1365

Glu Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys

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1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Gly Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asn Asn Ile Ser Phe Trp Lys Leu

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1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser

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1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Ser Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Ser Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asn Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile

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1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

Tyr Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Val Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr His

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2165 2170 2175

Asn Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Lys Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Ile Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Thr His Leu Cys Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Ser Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Val
2330 2335 2340

Ala Val Thr Gly Trp Gln Thr Ile Asp Gly Glu Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp

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2360 2365 2370

Gly Lys Arg Tyr Tyr Phe Asn Thr Asn Thr Tyr Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Tyr Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asp Ser

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2555 2560 2565

Lys Ala Ala Thr Gly Trp Ala Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Ser Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

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<211> 2709
<212> PRT
<213> Artificial Sequence

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<223> Synthetic amino acid sequence

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Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1               5                  10                  15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
            20                  25                  30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Ala Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205
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```
Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415
```

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Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Gln Ile Asn Ser Leu Ala Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
530 535 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545 550 555 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
565 570 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
580 585 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
595 600 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
610 615 620

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```
Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625                 630                 635                 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
                645                 650                 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
            660                 665                 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
        675                 680                 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
    690                 695                 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705                 710                 715                 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
                725                 730                 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
            740                 745                 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
        755                 760                 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
    770                 775                 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785                 790                 795                 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
                805                 810                 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
            820                 825                 830
```

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Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
835 840 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
850 855 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865 870 875 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
885 890 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
900 905 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
915 920 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
930 935 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945 950 955 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
965 970 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
980 985 990

Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln Leu
995 1000 1005

Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val Leu
1010 1015 1020

Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu Asp
1025 1030 1035

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```
Gly Ile  Asn Leu Gly Ala Ala  Ile Lys Glu Leu Leu  Asp Glu His
    1040                1045                1050

Asp Pro  Leu Leu Lys Lys Glu  Leu Glu Ala Lys Val  Gly Val Leu
    1055                1060                1065

Ala Ile  Asn Met Ser Leu Ser  Ile Ala Ala Thr Val  Ala Ser Ile
    1070                1075                1080

Val Gly  Ile Gly Ala Glu Val  Thr Ile Phe Leu Leu  Pro Ile Ala
    1085                1090                1095

Gly Ile  Ser Ala Gly Ile Pro  Ser Leu Val Asn Asn  Glu Leu Ile
    1100                1105                1110

Leu His  Asp Lys Ala Thr Ser  Val Val Asn Tyr Phe  Asn His Leu
    1115                1120                1125

Ser Glu  Ser Lys Lys Tyr Gly  Pro Leu Lys Thr Glu  Asp Asp Lys
    1130                1135                1140

Ile Leu  Val Pro Ile Asp Asp  Leu Val Ile Ser Glu  Ile Asp Phe
    1145                1150                1155

Asn Asn  Asn Ser Ile Lys Leu  Gly Thr Cys Asn Ile  Leu Ala Met
    1160                1165                1170

Glu Gly  Gly Ser Gly His Thr  Val Thr Gly Asn Ile  Asp His Phe
    1175                1180                1185

Phe Ser  Ser Pro Ser Ile Ser  Ser His Ile Pro Ser  Leu Ser Ile
    1190                1195                1200

Tyr Ser  Ala Ile Gly Ile Glu  Thr Glu Asn Leu Asp  Phe Ser Lys
    1205                1210                1215

Lys Ile  Met Met Leu Pro Asn  Ala Pro Ser Arg Val  Phe Trp Trp
    1220                1225                1230
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```
Glu Thr  Gly Ala Val Pro Gly  Leu Arg Ser Leu Glu  Asn Asp Gly
    1235                1240                1245

Thr Arg  Leu Leu Asp Ser Ile  Arg Asp Leu Tyr Pro  Gly Lys Phe
    1250                1255                1260

Tyr Trp  Arg Phe Tyr Ala Phe  Phe Asp Tyr Ala Ile  Thr Thr Leu
    1265                1270                1275

Lys Pro  Val Tyr Glu Asp Thr  Asn Ile Lys Ile Lys  Leu Asp Lys
    1280                1285                1290

Asp Thr  Arg Asn Phe Ile Met  Pro Thr Ile Thr Thr  Asn Glu Ile
    1295                1300                1305

Arg Asn  Lys Leu Ser Tyr Ser  Phe Asp Gly Ala Gly  Gly Thr Tyr
    1310                1315                1320

Ser Leu  Leu Leu Ser Ser Tyr  Pro Ile Ser Thr Asn  Ile Asn Leu
    1325                1330                1335

Ser Lys  Asp Asp Leu Trp Ile  Phe Asn Ile Asp Asn  Glu Val Arg
    1340                1345                1350

Glu Ile  Ser Ile Glu Asn Gly  Thr Ile Lys Lys Gly  Lys Leu Ile
    1355                1360                1365

Lys Asp  Val Leu Ser Lys Ile  Asp Ile Asn Lys Asn  Lys Leu Ile
    1370                1375                1380

Ile Gly  Asn Gln Thr Ile Asp  Phe Ser Gly Asp Ile  Asp Asn Lys
    1385                1390                1395

Asp Arg  Tyr Ile Phe Leu Thr  Cys Glu Leu Asp Asp  Lys Ile Ser
    1400                1405                1410

Leu Ile  Ile Glu Ile Asn Leu  Val Ala Lys Ser Tyr  Ser Leu Leu
    1415                1420                1425
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Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

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```
Asn Asn  Lys Asn Ile Asp Ile  Tyr Phe Gly Glu Trp  Lys Thr Ser
    1625                1630                1635

Ser Ser  Lys Ser Thr Ile Phe  Ser Gly Asn Gly Arg  Asn Val Val
    1640                1645                1650

Val Glu  Pro Ile Tyr Asn Pro  Asp Thr Gly Glu Asp  Ile Ser Thr
    1655                1660                1665

Ser Leu  Asp Phe Ser Tyr Glu  Pro Leu Tyr Gly Ile  Asp Arg Tyr
    1670                1675                1680

Ile Asn  Lys Val Leu Ile Ala  Pro Asp Leu Tyr Thr  Ser Leu Ile
    1685                1690                1695

Asn Ile  Asn Thr Asn Tyr Tyr  Ser Asn Glu Tyr Tyr  Pro Glu Ile
    1700                1705                1710

Ile Val  Leu Asn Pro Asn Thr  Phe His Lys Lys Val  Asn Ile Asn
    1715                1720                1725

Leu Asp  Ser Ser Ser Phe Glu  Tyr Lys Trp Ser Thr  Glu Gly Ser
    1730                1735                1740

Asp Phe  Ile Leu Val Arg Tyr  Leu Glu Glu Ser Asn  Lys Lys Ile
    1745                1750                1755

Leu Gln  Lys Ile Arg Ile Lys  Gly Ile Leu Ser Asn  Thr Gln Ser
    1760                1765                1770

Phe Asn  Lys Met Ser Ile Asp  Phe Lys Asp Ile Lys  Lys Leu Ser
    1775                1780                1785

Leu Gly  Tyr Ile Met Ser Asn  Phe Lys Ser Phe Asn  Ser Glu Asn
    1790                1795                1800

Glu Leu  Asp Arg Asp His Leu  Gly Phe Lys Ile Ile  Asp Asn Lys
    1805                1810                1815
```

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```
Thr Tyr  Tyr Tyr Asp Glu Asp  Ser Lys Leu Val Lys  Gly Leu Ile
    1820                 1825                 1830

Asn Ile  Asn Asn Ser Leu Phe  Tyr Phe Asp Pro Ile  Glu Phe Asn
    1835                 1840                 1845

Leu Val  Thr Gly Trp Gln Thr  Ile Asn Gly Lys Lys  Tyr Tyr Phe
    1850                 1855                 1860

Asp Ile  Asn Thr Gly Ala Ala  Leu Thr Ser Tyr Lys  Ile Ile Asn
    1865                 1870                 1875

Gly Lys  His Phe Tyr Phe Asn  Asn Asp Gly Val Met  Gln Leu Gly
    1880                 1885                 1890

Val Phe  Lys Gly Pro Asp Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    1895                 1900                 1905

Thr Gln  Asn Asn Asn Ile Glu  Gly Gln Ala Ile Val  Tyr Gln Ser
    1910                 1915                 1920

Lys Phe  Leu Thr Leu Asn Gly  Lys Lys Tyr Tyr Phe  Asp Asn Asp
    1925                 1930                 1935

Ser Lys  Ala Val Thr Gly Trp  Arg Ile Ile Asn Asn  Glu Lys Tyr
    1940                 1945                 1950

Tyr Phe  Asn Pro Asn Asn Ala  Ile Ala Ala Val Gly  Leu Gln Val
    1955                 1960                 1965

Ile Asp  Asn Asn Lys Tyr Tyr  Phe Asn Pro Asp Thr  Ala Ile Ile
    1970                 1975                 1980

Ser Lys  Gly Trp Gln Thr Val  Asn Gly Ser Arg Tyr  Tyr Phe Asp
    1985                 1990                 1995

Thr Asp  Thr Ala Ile Ala Phe  Asn Gly Tyr Lys Thr  Ile Asp Gly
    2000                 2005                 2010
```

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Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

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Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
2330 2335 2340

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

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```
Gly Ile  Met Gln Ile Gly Val  Phe Lys Gly Pro Asn  Gly Phe Glu
    2405                2410                2415

Tyr Phe  Ala Pro Ala Asn Thr  His Asn Asn Asn Ile  Glu Gly Gln
    2420                2425                2430

Ala Ile  Leu Tyr Gln Asn Lys  Phe Leu Thr Leu Asn  Gly Lys Lys
    2435                2440                2445

Tyr Tyr  Phe Gly Ser Asp Ser  Lys Ala Val Thr Gly  Leu Arg Thr
    2450                2455                2460

Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr Asn Thr  Ala Val Ala
    2465                2470                2475

Val Thr  Gly Trp Gln Thr Ile  Asn Gly Lys Lys Tyr  Tyr Phe Asn
    2480                2485                2490

Thr Asn  Thr Ser Ile Ala Ser  Thr Gly Tyr Thr Ile  Ile Ser Gly
    2495                2500                2505

Lys His  Phe Tyr Phe Asn Thr  Asp Gly Ile Met Gln  Ile Gly Val
    2510                2515                2520

Phe Lys  Gly Pro Asp Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr
    2525                2530                2535

Asp Ala  Asn Asn Ile Glu Gly  Gln Ala Ile Arg Tyr  Gln Asn Arg
    2540                2545                2550

Phe Leu  Tyr Leu His Asp Asn  Ile Tyr Tyr Phe Gly  Asn Asn Ser
    2555                2560                2565

Lys Ala  Ala Thr Gly Trp Val  Thr Ile Asp Gly Asn  Arg Tyr Tyr
    2570                2575                2580

Phe Glu  Pro Asn Thr Ala Met  Gly Ala Asn Gly Tyr  Lys Thr Ile
    2585                2590                2595
```

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Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

<210> 300
<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 300

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys

```
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Ala Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
```

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245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Ala Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile

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450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Gln Ile Asn Ser Leu Ala Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
530 535 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545 550 555 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
565 570 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
580 585 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
595 600 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
610 615 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625 630 635 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
645 650 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu

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660 665 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
675 680 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
690 695 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705 710 715 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
725 730 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
740 745 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
755 760 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
770 775 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785 790 795 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
805 810 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
820 825 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
835 840 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
850 855 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp

865 870 875 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
885 890 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
900 905 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
915 920 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
930 935 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945 950 955 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
965 970 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
980 985 990

Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln Leu
995 1000 1005

Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val Leu
1010 1015 1020

Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu Asp
1025 1030 1035

Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu His
1040 1045 1050

Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val Leu
1055 1060 1065

Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser Ile

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1070 1075 1080

Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile Ala
1085 1090 1095

Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile
1100 1105 1110

Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu
1115 1120 1125

Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys
1130 1135 1140

Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly
1235 1240 1245

Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu

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1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile
1355 1360 1365

Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile

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1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr

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1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe

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1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys

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2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly

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2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
2330 2335 2340

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys

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2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn

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2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

<210> 301
<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 301

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

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Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Ala Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Ala Met Leu
        275                 280                 285
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Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495
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Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Gln Ile Asn Ser Leu Ala Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
    530                 535                 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545                 550                 555                 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
        595                 600                 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
    610                 615                 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625                 630                 635                 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
                645                 650                 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
            660                 665                 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
        675                 680                 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
    690                 695                 700
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Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705                 710                 715                 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
                725                 730                 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
            740                 745                 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
        755                 760                 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
    770                 775                 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785                 790                 795                 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
                805                 810                 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
            820                 825                 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
        835                 840                 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
    850                 855                 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865                 870                 875                 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
                885                 890                 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
            900                 905                 910
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Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
        915                 920                 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
    930                 935                 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945                 950                 955                 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
                965                 970                 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
            980                 985                 990

Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Tyr Asp Ser  Ile Gln Leu
        995                 1000                1005

Val Asn  Leu Ile Ser Asn Ala  Val Asn Asp Thr Ile  Asn Val Leu
    1010                1015                1020

Pro Thr  Ile Thr Glu Gly Ile  Pro Ile Val Ser Thr  Ile Leu Asp
    1025                1030                1035

Gly Ile  Asn Leu Gly Ala Ala  Ile Lys Glu Leu Leu  Asp Glu His
    1040                1045                1050

Asp Pro  Leu Leu Lys Lys Glu  Leu Glu Ala Lys Val  Gly Val Leu
    1055                1060                1065

Ala Ile  Asn Met Ser Leu Ser  Ile Ala Ala Thr Val  Ala Ser Ile
    1070                1075                1080

Val Gly  Ile Gly Ala Glu Val  Thr Ile Phe Leu Leu  Pro Ile Ala
    1085                1090                1095

Gly Ile  Ser Ala Gly Ile Pro  Ser Leu Val Asn Asn  Glu Leu Ile
    1100                1105                1110
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Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu
1115 1120 1125

Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys
1130 1135 1140

Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly
1235 1240 1245

Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

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Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile
1355 1360 1365

Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe Asn
1490 1495 1500

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Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

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Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly
1880 1885 1890

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Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asp Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

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Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

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Glu Tyr Phe Ala Pro Ala Asn Thr Tyr Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
2330 2335 2340

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

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Val Thr  Gly Trp Gln Thr Ile  Asn Gly Lys Lys Tyr  Tyr Phe Asn
    2480                 2485                 2490

Thr Asn  Thr Ser Ile Ala Ser  Thr Gly Tyr Thr Ile  Ile Ser Gly
    2495                 2500                 2505

Lys His  Phe Tyr Phe Asn Thr  Asp Gly Ile Met Gln  Ile Gly Val
    2510                 2515                 2520

Phe Lys  Gly Pro Asp Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr
    2525                 2530                 2535

Asp Ala  Asn Asn Ile Glu Gly  Gln Ala Ile Arg Tyr  Gln Asn Arg
    2540                 2545                 2550

Phe Leu  Tyr Leu His Asp Asn  Ile Tyr Tyr Phe Gly  Asn Asn Ser
    2555                 2560                 2565

Lys Ala  Ala Thr Gly Trp Val  Thr Ile Asp Gly Asn  Arg Tyr Tyr
    2570                 2575                 2580

Phe Glu  Pro Asn Thr Ala Met  Gly Ala Asn Gly Tyr  Lys Thr Ile
    2585                 2590                 2595

Asp Asn  Lys Asn Phe Tyr Phe  Arg Asn Gly Leu Pro  Gln Ile Gly
    2600                 2605                 2610

Val Phe  Lys Gly Ser Asn Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2615                 2620                 2625

Thr Asp  Ala Asn Asn Ile Glu  Gly Gln Ala Ile Arg  Tyr Gln Asn
    2630                 2635                 2640

Arg Phe  Leu His Leu Leu Gly  Lys Ile Tyr Tyr Phe  Gly Asn Asn
    2645                 2650                 2655

Ser Lys  Ala Val Thr Gly Trp  Gln Thr Ile Asn Gly  Lys Val Tyr
    2660                 2665                 2670
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Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

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20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Ala Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp

```
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Gly
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
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325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Gln Gln
500 505 510

Ile Asn Ser Leu Ala Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln Phe
515 520 525

Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp Asn

```
    530                 535                 540

Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu Leu
545                 550                 555                 560

Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys Asn
                565                 570                 575

Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr Glu
            580                 585                 590

Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile Ile
        595                 600                 605

Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp Asp
    610                 615                 620

Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg Leu
625                 630                 635                 640

Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys Asp
                645                 650                 655

Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu Ser
            660                 665                 670

Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser Pro
        675                 680                 685

Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Asp
    690                 695                 700

Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile Met
705                 710                 715                 720

Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile Thr
                725                 730                 735

Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Lys
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740 745 750

Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala Ile
755 760 765

Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile Asp
770 775 780

Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser Ile
785 790 795 800

Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro Asp
805 810 815

Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser Ile
820 825 830

Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile Ile
835 840 845

His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu Asn
850 855 860

Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp Glu
865 870 875 880

Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr Tyr
885 890 895

Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val Glu
900 905 910

Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys Glu
915 920 925

Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn Leu
930 935 940

Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu Asn

945 950 955 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys Asp
965 970 975

Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala Gln
980 985 990

Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln Leu Val
995 1000 1005

Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val Leu Pro
1010 1015 1020

Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu Asp Gly
1025 1030 1035

Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu His Asp
1040 1045 1050

Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val Leu Ala
1055 1060 1065

Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser Ile Val
1070 1075 1080

Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile Ala Gly
1085 1090 1095

Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile Leu
1100 1105 1110

His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu Ser
1115 1120 1125

Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys Ile
1130 1135 1140

Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn

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1145 1150 1155

Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met Glu
1160 1165 1170

Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe Phe
1175 1180 1185

Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile Tyr
1190 1195 1200

Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser Lys Lys
1205 1210 1215

Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp Glu
1220 1225 1230

Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr
1235 1240 1245

Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe Tyr
1250 1255 1260

Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu Lys
1265 1270 1275

Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys Asp
1280 1285 1290

Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile Arg
1295 1300 1305

Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr Ser
1310 1315 1320

Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu Ser
1325 1330 1335

Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg Glu

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1340 1345 1350

Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile Lys
1355 1360 1365

Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile Ile
1370 1375 1380

Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys Asp
1385 1390 1395

Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser Leu
1400 1405 1410

Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu Leu
1415 1420 1425

Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Ile Ile
1430 1435 1440

Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala Tyr
1445 1450 1455

Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile Ser
1460 1465 1470

Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser Lys
1475 1480 1485

Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe Asn Ser
1490 1495 1500

Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp Asp
1505 1510 1515

Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr Asp
1520 1525 1530

Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln Val

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1535 1540 1545

Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser Tyr
1550 1555 1560

Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser Asn
1565 1570 1575

Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu Phe
1580 1585 1590

Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr Leu
1595 1600 1605

Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp Asn
1610 1615 1620

Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser Ser
1625 1630 1635

Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val Val
1640 1645 1650

Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr Ser
1655 1660 1665

Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr Ile
1670 1675 1680

Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile Asn
1685 1690 1695

Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile Ile
1700 1705 1710

Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn Leu
1715 1720 1725

Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser Asp

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1730 1735 1740

Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile Leu
1745 1750 1755

Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser Phe
1760 1765 1770

Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser Leu
1775 1780 1785

Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn Glu
1790 1795 1800

Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys Thr
1805 1810 1815

Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile Asn
1820 1825 1830

Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn Leu
1835 1840 1845

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asp
1850 1855 1860

Ile Asn Thr Gly Ala Ala Leu Ile Ser Tyr Lys Ile Ile Asn Gly
1865 1870 1875

Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly Val
1880 1885 1890

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
1895 1900 1905

Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
1910 1915 1920

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp Ser

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1925 1930 1935

Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr Tyr
1940 1945 1950

Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val Ile
1955 1960 1965

Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile Ser
1970 1975 1980

Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp Thr
1985 1990 1995

Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly Lys
2000 2005 2010

His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val Phe
2015 2020 2025

Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Tyr
2030 2035 2040

Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys Phe
2045 2050 2055

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser Lys
2060 2065 2070

Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr Phe
2075 2080 2085

Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2090 2095 2100

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr
2105 2110 2115

Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn

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2120 2125 2130

Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys His
2135 2140 2145

Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys
2150 2155 2160

Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala
2165 2170 2175

Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe Leu
2180 2185 2190

Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala
2195 2200 2205

Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe Asn
2210 2215 2220

Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn Asn
2225 2230 2235

Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly Tyr
2240 2245 2250

Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn Glu
2255 2260 2265

Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2270 2275 2280

Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
2285 2290 2295

Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2300 2305 2310

Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln Thr

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2315 2320 2325

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu Ala
2330 2335 2340

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2345 2350 2355

Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly
2360 2365 2370

Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr Gly
2375 2380 2385

Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp Gly
2390 2395 2400

Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr
2405 2410 2415

Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln Ala
2420 2425 2430

Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr
2435 2440 2445

Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile
2450 2455 2460

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val
2465 2470 2475

Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr
2480 2485 2490

Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys
2495 2500 2505

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe

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2510 2515 2520

Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2525 2530 2535

Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe
2540 2545 2550

Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser Lys
2555 2560 2565

Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr Phe
2570 2575 2580

Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile Asp
2585 2590 2595

Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly Val
2600 2605 2610

Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2615 2620 2625

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2630 2635 2640

Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn Ser
2645 2650 2655

Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr Tyr
2660 2665 2670

Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe Glu
2675 2680 2685

Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala
2690 2695 2700

Pro Gly Ile Tyr Gly

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2705

<210> 303
<211> 2708
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

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Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Ala Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
130 135 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145 150 155 160

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Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365
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Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Gln Gln
            500                 505                 510

Ile Asn Ser Leu Ala Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln Phe
        515                 520                 525

Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp Asn
    530                 535                 540

Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu Leu
545                 550                 555                 560

Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys Asn
                565                 570                 575
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Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr Glu
            580                 585                 590

Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile Ile
        595                 600                 605

Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp Asp
    610                 615                 620

Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg Leu
625                 630                 635                 640

Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys Asp
                645                 650                 655

Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu Ser
            660                 665                 670

Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser Pro
        675                 680                 685

Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Asp
    690                 695                 700

Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile Met
705                 710                 715                 720

Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile Thr
                725                 730                 735

Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Lys
            740                 745                 750

Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala Ile
        755                 760                 765

Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile Asp
    770                 775                 780
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Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser Ile
785                 790                 795                 800

Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro Asp
                805                 810                 815

Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser Ile
            820                 825                 830

Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile Ile
        835                 840                 845

His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu Asn
    850                 855                 860

Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp Glu
865                 870                 875                 880

Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr Tyr
                885                 890                 895

Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val Glu
            900                 905                 910

Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys Glu
        915                 920                 925

Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn Leu
    930                 935                 940

Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu Asn
945                 950                 955                 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys Asp
                965                 970                 975

Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala Gln
            980                 985                 990
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Leu Phe Ser Thr Gly Leu Asn Thr  Ile Tyr Asp Ser Ile  Gln Leu Val
        995                 1000                1005


Asn Leu  Ile Ser Asn Ala Val  Asn Asp Thr Ile Asn  Val Leu Pro
    1010                1015                1020


Thr Ile  Thr Glu Gly Ile Pro  Ile Val Ser Thr Ile  Leu Asp Gly
    1025                1030                1035


Ile Asn  Leu Gly Ala Ala Ile  Lys Glu Leu Leu Asp  Glu His Asp
    1040                1045                1050


Pro Leu  Leu Lys Lys Glu Leu  Glu Ala Lys Val Gly  Val Leu Ala
    1055                1060                1065


Ile Asn  Met Ser Leu Ser Ile  Ala Ala Thr Val Ala  Ser Ile Val
    1070                1075                1080


Gly Ile  Gly Ala Glu Val Thr  Ile Phe Leu Leu Pro  Ile Ala Gly
    1085                1090                1095


Ile Ser  Ala Gly Ile Pro Ser  Leu Val Asn Asn Glu  Leu Ile Leu
    1100                1105                1110


His Asp  Lys Ala Thr Ser Val  Val Asn Tyr Phe Asn  His Leu Ser
    1115                1120                1125


Glu Ser  Lys Lys Tyr Gly Pro  Leu Lys Thr Glu Asp  Asp Lys Ile
    1130                1135                1140


Leu Val  Pro Ile Asp Asp Leu  Val Ile Ser Glu Ile  Asp Phe Asn
    1145                1150                1155


Asn Asn  Ser Ile Lys Leu Gly  Thr Cys Asn Ile Leu  Ala Met Glu
    1160                1165                1170


Gly Gly  Ser Gly His Thr Val  Thr Gly Asn Ile Asp  His Phe Phe
    1175                1180                1185
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```
Ser Ser  Pro Ser Ile Ser Ser  His Ile Pro Ser Leu  Ser Ile Tyr
    1190                1195                1200

Ser Ala  Ile Gly Ile Glu Thr  Glu Asn Leu Asp Phe  Ser Lys Lys
    1205                1210                1215

Ile Met  Met Leu Pro Asn Ala  Pro Ser Arg Val Phe  Trp Trp Glu
    1220                1225                1230

Thr Gly  Ala Val Pro Gly Leu  Arg Ser Leu Glu Asn  Asp Gly Thr
    1235                1240                1245

Arg Leu  Leu Asp Ser Ile Arg  Asp Leu Tyr Pro Gly  Lys Phe Tyr
    1250                1255                1260

Trp Arg  Phe Tyr Ala Phe Phe  Asp Tyr Ala Ile Thr  Thr Leu Lys
    1265                1270                1275

Pro Val  Tyr Glu Asp Thr Asn  Ile Lys Ile Lys Leu  Asp Lys Asp
    1280                1285                1290

Thr Arg  Asn Phe Ile Met Pro  Thr Ile Thr Thr Asn  Glu Ile Arg
    1295                1300                1305

Asn Lys  Leu Ser Tyr Ser Phe  Asp Gly Ala Gly Gly  Thr Tyr Ser
    1310                1315                1320

Leu Leu  Leu Ser Ser Tyr Pro  Ile Ser Thr Asn Ile  Asn Leu Ser
    1325                1330                1335

Lys Asp  Asp Leu Trp Ile Phe  Asn Ile Asp Asn Glu  Val Arg Glu
    1340                1345                1350

Ile Ser  Ile Glu Asn Gly Thr  Ile Lys Lys Gly Lys  Leu Ile Lys
    1355                1360                1365

Asp Val  Leu Ser Lys Ile Asp  Ile Asn Lys Asn Lys  Leu Ile Ile
    1370                1375                1380
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Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys Asp
1385 1390 1395

Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser Leu
1400 1405 1410

Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu Leu
1415 1420 1425

Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr Ile
1430 1435 1440

Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala Tyr
1445 1450 1455

Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile Ser
1460 1465 1470

Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser Lys
1475 1480 1485

Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe Asn Ser
1490 1495 1500

Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp Asp
1505 1510 1515

Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr Asp
1520 1525 1530

Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln Val
1535 1540 1545

Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser Tyr
1550 1555 1560

Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser Asn
1565 1570 1575

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Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu Phe
1580 1585 1590

Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr Leu
1595 1600 1605

Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp Asn
1610 1615 1620

Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser Ser
1625 1630 1635

Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val Val
1640 1645 1650

Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr Ser
1655 1660 1665

Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr Ile
1670 1675 1680

Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile Asn
1685 1690 1695

Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile Ile
1700 1705 1710

Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn Leu
1715 1720 1725

Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser Asp
1730 1735 1740

Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile Leu
1745 1750 1755

Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser Phe
1760 1765 1770

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Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser Leu
1775 1780 1785

Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn Glu
1790 1795 1800

Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys Thr
1805 1810 1815

Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile Asn
1820 1825 1830

Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn Leu
1835 1840 1845

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asp
1850 1855 1860

Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn Gly
1865 1870 1875

Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly Val
1880 1885 1890

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
1895 1900 1905

Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
1910 1915 1920

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp Ser
1925 1930 1935

Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr Tyr
1940 1945 1950

Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val Ile
1955 1960 1965

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Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile Ser
1970 1975 1980

Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp Thr
1985 1990 1995

Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly Lys
2000 2005 2010

His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val Phe
2015 2020 2025

Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Tyr
2030 2035 2040

Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys Phe
2045 2050 2055

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser Lys
2060 2065 2070

Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr Phe
2075 2080 2085

Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2090 2095 2100

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr
2105 2110 2115

Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn
2120 2125 2130

Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys His
2135 2140 2145

Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys
2150 2155 2160

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Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala
2165 2170 2175

Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe Leu
2180 2185 2190

Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala
2195 2200 2205

Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe Asn
2210 2215 2220

Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn Asn
2225 2230 2235

Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly Tyr
2240 2245 2250

Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn Glu
2255 2260 2265

Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2270 2275 2280

Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
2285 2290 2295

Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2300 2305 2310

Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln Thr
2315 2320 2325

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu Ala
2330 2335 2340

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2345 2350 2355

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Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly
2360 2365 2370

Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr Gly
2375 2380 2385

Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp Gly
2390 2395 2400

Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr
2405 2410 2415

Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln Ala
2420 2425 2430

Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr
2435 2440 2445

Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile
2450 2455 2460

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val
2465 2470 2475

Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr
2480 2485 2490

Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys
2495 2500 2505

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2510 2515 2520

Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2525 2530 2535

Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe
2540 2545 2550

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Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser Lys
2555 2560 2565

Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr Phe
2570 2575 2580

Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile Asp
2585 2590 2595

Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly Val
2600 2605 2610

Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2615 2620 2625

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2630 2635 2640

Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn Ser
2645 2650 2655

Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr Tyr
2660 2665 2670

Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe Glu
2675 2680 2685

Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala
2690 2695 2700

Pro Gly Ile Tyr Gly
2705

<210> 304
<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

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<400> 304

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Ala Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
130 135 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145 150 155 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
165 170 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
180 185 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu

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195 200 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
210 215 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225 230 235 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Ala Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile

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405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Gln Ile Asn Ser Leu Ala Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
530 535 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545 550 555 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
565 570 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
580 585 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
595 600 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp

610 615 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625 630 635 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
645 650 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
660 665 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
675 680 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
690 695 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705 710 715 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
725 730 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
740 745 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
755 760 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
770 775 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785 790 795 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
805 810 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser

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820 825 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
835 840 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
850 855 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865 870 875 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
885 890 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
900 905 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
915 920 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
930 935 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945 950 955 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
965 970 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
980 985 990

Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln Leu
995 1000 1005

Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val Leu
1010 1015 1020

Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu Asp

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1025 1030 1035

Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu His
1040 1045 1050

Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val Leu
1055 1060 1065

Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser Ile
1070 1075 1080

Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile Ala
1085 1090 1095

Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile
1100 1105 1110

Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu
1115 1120 1125

Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys
1130 1135 1140

Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp

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1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly
1235 1240 1245

Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile
1355 1360 1365

Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu

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1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp

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1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys

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1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly

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2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys

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2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
2330 2335 2340

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp

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2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile

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2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

<210> 305
<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 305

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1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

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Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Ala Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240
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Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445
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Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Gln Ile Asn Ser Leu Ala Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
    530                 535                 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545                 550                 555                 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
        595                 600                 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
    610                 615                 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625                 630                 635                 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
                645                 650                 655
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Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
            660                 665                 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
        675                 680                 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
    690                 695                 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705                 710                 715                 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
                725                 730                 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
            740                 745                 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
        755                 760                 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
    770                 775                 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785                 790                 795                 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
                805                 810                 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
            820                 825                 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
        835                 840                 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
    850                 855                 860
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Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865                 870                 875                 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
                885                 890                 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
            900                 905                 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
        915                 920                 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
    930                 935                 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945                 950                 955                 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
                965                 970                 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
            980                 985                 990

Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Tyr Asp Ser  Ile Gln Leu
        995                 1000                1005

Val Asn  Leu Ile Ser Asn Ala  Val Asn Asp Thr Ile  Asn Val Leu
    1010                1015                1020

Pro Thr  Ile Thr Glu Gly Ile  Pro Ile Val Ser Thr  Ile Leu Asp
    1025                1030                1035

Gly Ile  Asn Leu Gly Ala Ala  Ile Lys Glu Leu Leu  Asp Glu His
    1040                1045                1050

Asp Pro  Leu Leu Lys Lys Glu  Leu Glu Ala Lys Val  Gly Val Leu
    1055                1060                1065
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Ala Ile  Asn Met Ser Leu Ser  Ile Ala Ala Thr Val  Ala Ser Ile
    1070                1075                1080

Val Gly  Ile Gly Ala Glu Val  Thr Ile Phe Leu Leu  Pro Ile Ala
    1085                1090                1095

Gly Ile  Ser Ala Gly Ile Pro  Ser Leu Val Asn Asn  Glu Leu Ile
    1100                1105                1110

Leu His  Asp Lys Ala Thr Ser  Val Val Asn Tyr Phe  Asn His Leu
    1115                1120                1125

Ser Glu  Ser Lys Lys Tyr Gly  Pro Leu Lys Thr Glu  Asp Asp Lys
    1130                1135                1140

Ile Leu  Val Pro Ile Asp Asp  Leu Val Ile Ser Glu  Ile Asp Phe
    1145                1150                1155

Asn Asn  Asn Ser Ile Lys Leu  Gly Thr Cys Asn Ile  Leu Ala Met
    1160                1165                1170

Glu Gly  Gly Ser Gly His Thr  Val Thr Gly Asn Ile  Asp His Phe
    1175                1180                1185

Phe Ser  Ser Pro Ser Ile Ser  Ser His Ile Pro Ser  Leu Ser Ile
    1190                1195                1200

Tyr Ser  Ala Ile Gly Ile Glu  Thr Glu Asn Leu Asp  Phe Ser Lys
    1205                1210                1215

Lys Ile  Met Met Leu Pro Asn  Ala Pro Ser Arg Val  Phe Trp Trp
    1220                1225                1230

Glu Thr  Gly Ala Val Pro Gly  Leu Arg Ser Leu Glu  Asn Asp Gly
    1235                1240                1245

Thr Arg  Leu Leu Asp Ser Ile  Arg Asp Leu Tyr Pro  Gly Lys Phe
    1250                1255                1260
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Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile
1355 1360 1365

Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asn Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

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Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Gly Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

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Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn
1835 1840 1845

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Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

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Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asp Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn
2225 2230 2235

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Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
2330 2335 2340

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
2420 2425 2430

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Ala Ile  Leu Tyr Gln Asn Lys  Phe Leu Thr Leu Asn  Gly Lys Lys
    2435                2440                2445

Tyr Tyr  Phe Gly Ser Asp Ser  Lys Ala Val Thr Gly  Leu Arg Thr
    2450                2455                2460

Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr Asn Thr  Ala Val Ala
    2465                2470                2475

Val Thr  Gly Trp Gln Thr Ile  Asn Gly Lys Lys Tyr  Tyr Phe Asn
    2480                2485                2490

Thr Asn  Thr Ser Ile Ala Ser  Thr Gly Tyr Thr Ile  Ile Ser Gly
    2495                2500                2505

Lys His  Phe Tyr Phe Asn Thr  Asp Gly Ile Met Gln  Ile Gly Val
    2510                2515                2520

Phe Lys  Gly Pro Asp Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr
    2525                2530                2535

Asp Ala  Asn Asn Ile Glu Gly  Gln Ala Ile Arg Tyr  Gln Asn Arg
    2540                2545                2550

Phe Leu  Tyr Leu His Asp Asn  Ile Tyr Tyr Phe Gly  Asn Asn Ser
    2555                2560                2565

Lys Ala  Ala Thr Gly Trp Val  Thr Ile Asp Gly Asn  Arg Tyr Tyr
    2570                2575                2580

Phe Glu  Pro Asn Thr Ala Met  Gly Ala Asn Gly Tyr  Lys Thr Ile
    2585                2590                2595

Asp Asn  Lys Asn Phe Tyr Phe  Arg Asn Gly Leu Pro  Gln Ile Gly
    2600                2605                2610

Val Phe  Lys Gly Ser Asn Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2615                2620                2625
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Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

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<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

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Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu

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65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Ala Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
130 135 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145 150 155 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
165 170 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
180 185 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
195 200 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
210 215 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225 230 235 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Ala Met Leu

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275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu

485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Gln Ile Asn Ser Leu Ala Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
530 535 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545 550 555 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
565 570 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
580 585 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
595 600 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
610 615 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625 630 635 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
645 650 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
660 665 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
675 680 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr

690 695 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705 710 715 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
725 730 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
740 745 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
755 760 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
770 775 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785 790 795 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
805 810 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
820 825 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
835 840 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
850 855 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865 870 875 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
885 890 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val

900 905 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
915 920 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
930 935 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945 950 955 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
965 970 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
980 985 990

Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln Leu
995 1000 1005

Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val Leu
1010 1015 1020

Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu Asp
1025 1030 1035

Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu His
1040 1045 1050

Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val Leu
1055 1060 1065

Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser Ile
1070 1075 1080

Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile Ala
1085 1090 1095

Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile

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1100 1105 1110

Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu
1115 1120 1125

Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys
1130 1135 1140

Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly
1235 1240 1245

Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile

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1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile
1355 1360 1365

Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asn Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe Asn

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1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Gly Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile

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1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly

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1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asp Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr

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2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe

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2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
2330 2335 2340

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala

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2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr

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2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

<210> 307
<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 307

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Ala Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

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Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320
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Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Gln Ile Asn Ser Leu Ala Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525
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Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
    530                 535                 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545                 550                 555                 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
        595                 600                 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
    610                 615                 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625                 630                 635                 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
                645                 650                 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
            660                 665                 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
        675                 680                 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
    690                 695                 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705                 710                 715                 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
                725                 730                 735
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Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
            740                 745                 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
        755                 760                 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
    770                 775                 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785                 790                 795                 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
                805                 810                 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
            820                 825                 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
        835                 840                 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
    850                 855                 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865                 870                 875                 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
                885                 890                 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
            900                 905                 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
        915                 920                 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
    930                 935                 940
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Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945                 950                 955                 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
                965                 970                 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
            980                 985                 990

Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Tyr Asp Ser  Ile Gln Leu
        995                 1000                1005

Val Asn  Leu Ile Ser Asn Ala  Val Asn Asp Thr Ile  Asn Val Leu
    1010                1015                1020

Pro Thr  Ile Thr Glu Gly Ile  Pro Ile Val Ser Thr  Ile Leu Asp
    1025                1030                1035

Gly Ile  Asn Leu Gly Ala Ala  Ile Lys Glu Leu Leu  Asp Glu His
    1040                1045                1050

Asp Pro  Leu Leu Lys Lys Glu  Leu Glu Ala Lys Val  Gly Val Leu
    1055                1060                1065

Ala Ile  Asn Met Ser Leu Ser  Ile Ala Ala Thr Val  Ala Ser Ile
    1070                1075                1080

Val Gly  Ile Gly Ala Glu Val  Thr Ile Phe Leu Leu  Pro Ile Ala
    1085                1090                1095

Gly Ile  Ser Ala Gly Ile Pro  Ser Leu Val Asn Asn  Glu Leu Ile
    1100                1105                1110

Leu His  Asp Lys Ala Thr Ser  Val Val Asn Tyr Phe  Asn His Leu
    1115                1120                1125

Ser Glu  Ser Lys Lys Tyr Gly  Pro Leu Lys Thr Glu  Asp Asp Lys
    1130                1135                1140
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Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly
1235 1240 1245

Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
1325 1330 1335

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Ser Lys  Asp Asp Leu Trp Ile  Phe Asn Ile Asp Asn  Glu Val Arg
    1340                1345                1350

Glu Ile  Ser Ile Glu Asn Gly  Thr Ile Lys Lys Gly  Lys Leu Ile
    1355                1360                1365

Lys Asp  Val Leu Ser Lys Ile  Asp Ile Asn Lys Asn  Lys Leu Ile
    1370                1375                1380

Ile Gly  Asn Gln Thr Ile Asp  Phe Ser Gly Asp Ile  Asp Asn Lys
    1385                1390                1395

Asp Arg  Tyr Ile Phe Leu Thr  Cys Glu Leu Asp Asp  Lys Ile Ser
    1400                1405                1410

Leu Ile  Ile Glu Ile Asn Leu  Val Ala Lys Ser Tyr  Ser Leu Leu
    1415                1420                1425

Leu Ser  Gly Asp Lys Asn Tyr  Leu Ile Ser Asn Leu  Ser Asn Thr
    1430                1435                1440

Ile Glu  Lys Ile Asn Thr Leu  Gly Leu Asp Ser Lys  Asn Ile Ala
    1445                1450                1455

Tyr Asn  Tyr Thr Asp Glu Ser  Asn Asn Lys Tyr Phe  Gly Ala Ile
    1460                1465                1470

Ser Lys  Thr Ser Gln Lys Ser  Ile Ile His Tyr Lys  Lys Asp Ser
    1475                1480                1485

Lys Asn  Ile Leu Glu Phe Tyr  Asn Asp Ser Thr Leu  Glu Phe Asn
    1490                1495                1500

Ser Lys  Asp Phe Ile Ala Glu  Asp Ile Asn Val Phe  Met Lys Asp
    1505                1510                1515

Asp Ile  Asn Thr Ile Thr Gly  Lys Tyr Tyr Val Asp  Asn Asn Thr
    1520                1525                1530
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Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

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Leu Asp  Ser Ser Ser Phe Glu  Tyr Lys Trp Ser Thr  Glu Gly Ser
    1730                1735                1740

Asp Phe  Ile Leu Val Arg Tyr  Leu Glu Glu Ser Asn  Lys Lys Ile
    1745                1750                1755

Leu Gln  Lys Ile Arg Ile Lys  Gly Ile Leu Ser Asn  Thr Gln Ser
    1760                1765                1770

Phe Asn  Lys Met Ser Ile Asp  Phe Lys Asp Ile Lys  Lys Leu Ser
    1775                1780                1785

Leu Gly  Tyr Ile Met Ser Asn  Phe Lys Ser Phe Asn  Ser Glu Asn
    1790                1795                1800

Glu Leu  Asp Arg Asp His Leu  Gly Phe Lys Ile Ile  Asp Asn Lys
    1805                1810                1815

Thr Tyr  Tyr Tyr Asp Glu Asp  Ser Lys Leu Val Lys  Gly Leu Ile
    1820                1825                1830

Asn Ile  Asn Asn Ser Leu Phe  Tyr Phe Asp Pro Ile  Glu Phe Asn
    1835                1840                1845

Leu Val  Thr Gly Trp Gln Thr  Ile Asn Gly Lys Lys  Tyr Tyr Phe
    1850                1855                1860

Asp Ile  Asn Thr Gly Ala Ala  Leu Thr Ser Tyr Lys  Ile Ile Asn
    1865                1870                1875

Gly Lys  His Phe Tyr Phe Asn  Asn Asp Gly Val Met  Gln Leu Gly
    1880                1885                1890

Val Phe  Lys Gly Pro Asp Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    1895                1900                1905

Thr Gln  Asn Asn Asn Ile Glu  Gly Gln Ala Ile Val  Tyr Gln Ser
    1910                1915                1920
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Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

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Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

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Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
2330 2335 2340

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

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Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

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Ala Pro Gly Ile Tyr Gly
2705

<210> 308
<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 308

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Ala Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
130 135 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln

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145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
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355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Gln Ile Asn Ser Leu Ala Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
530 535 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545 550 555 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys

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565 570 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
580 585 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
595 600 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
610 615 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625 630 635 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
645 650 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
660 665 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
675 680 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
690 695 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705 710 715 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
725 730 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
740 745 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
755 760 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile

770 775 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785 790 795 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
805 810 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
820 825 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
835 840 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
850 855 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865 870 875 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
885 890 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
900 905 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
915 920 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
930 935 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945 950 955 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
965 970 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala

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            980                 985                 990

Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Tyr Asp Ser  Ile Gln Leu
        995                1000                1005

Val Asn  Leu Ile Ser Asn Ala  Val Asn Asp Thr Ile  Asn Val Leu
    1010                1015                1020

Pro Thr  Ile Thr Glu Gly Ile  Pro Ile Val Ser Thr  Ile Leu Asp
    1025                1030                1035

Gly Ile  Asn Leu Gly Ala Ala  Ile Lys Glu Leu Leu  Asp Glu His
    1040                1045                1050

Asp Pro  Leu Leu Lys Lys Glu  Leu Glu Ala Lys Val  Gly Val Leu
    1055                1060                1065

Ala Ile  Asn Met Ser Leu Ser  Ile Ala Ala Thr Val  Ala Ser Ile
    1070                1075                1080

Val Gly  Ile Gly Ala Glu Val  Thr Ile Phe Leu Leu  Pro Ile Ala
    1085                1090                1095

Gly Ile  Ser Ala Gly Ile Pro  Ser Leu Val Asn Asn  Glu Leu Ile
    1100                1105                1110

Leu His  Asp Lys Ala Thr Ser  Val Val Asn Tyr Phe  Asn His Leu
    1115                1120                1125

Ser Glu  Ser Lys Lys Tyr Gly  Pro Leu Lys Thr Glu  Asp Asp Lys
    1130                1135                1140

Ile Leu  Val Pro Ile Asp Asp  Leu Val Ile Ser Glu  Ile Asp Phe
    1145                1150                1155

Asn Asn  Asn Ser Ile Lys Leu  Gly Thr Cys Asn Ile  Leu Ala Met
    1160                1165                1170

Glu Gly  Gly Ser Gly His Thr  Val Thr Gly Asn Ile  Asp His Phe
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1175 1180 1185

Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asn Gly
1235 1240 1245

Thr Lys Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile
1355 1360 1365

Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile

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1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Gly Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser

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1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser

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1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val

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1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asp Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe

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2150 2155 2160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr Tyr Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
2330 2335 2340

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe

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2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg

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2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

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Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
            20                  25                  30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Ala Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190
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```
Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400
```

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```
Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Gln Ile Asn Ser Leu Ala Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
    530                 535                 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545                 550                 555                 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
        595                 600                 605
```

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```
Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
    610                 615                 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625                 630                 635                 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
                645                 650                 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
            660                 665                 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
        675                 680                 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
    690                 695                 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705                 710                 715                 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
                725                 730                 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
            740                 745                 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
        755                 760                 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
    770                 775                 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785                 790                 795                 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
                805                 810                 815
```

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```
Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
            820                 825                 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
        835                 840                 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
    850                 855                 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865                 870                 875                 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
                885                 890                 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
            900                 905                 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
        915                 920                 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
    930                 935                 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945                 950                 955                 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
                965                 970                 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
            980                 985                 990

Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Tyr Asp Ser  Ile Gln Leu
        995                 1000                1005

Val Asn  Leu Ile Ser Asn Ala  Val Asn Asp Thr Ile  Asn Val Leu
    1010                1015                1020
```

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```
Pro Thr  Ile Thr Glu Gly Ile  Pro Ile Val Ser Thr  Ile Leu Asp
    1025                1030                1035

Gly Ile  Asn Leu Gly Ala Ala  Ile Lys Glu Leu Leu  Asp Glu His
    1040                1045                1050

Asp Pro  Leu Leu Lys Lys Glu  Leu Glu Ala Lys Val  Gly Val Leu
    1055                1060                1065

Ala Ile  Asn Met Ser Leu Ser  Ile Ala Ala Thr Val  Ala Ser Ile
    1070                1075                1080

Val Gly  Ile Gly Ala Glu Val  Thr Ile Phe Leu Leu  Pro Ile Ala
    1085                1090                1095

Gly Ile  Ser Ala Gly Ile Pro  Ser Leu Val Asn Asn  Glu Leu Ile
    1100                1105                1110

Leu His  Asp Lys Ala Thr Ser  Val Val Asn Tyr Phe  Asn His Leu
    1115                1120                1125

Ser Glu  Ser Lys Lys Tyr Gly  Pro Leu Lys Thr Glu  Asp Asp Lys
    1130                1135                1140

Ile Leu  Val Pro Ile Asp Asp  Leu Val Ile Ser Glu  Ile Asp Phe
    1145                1150                1155

Asn Asn  Asn Ser Ile Lys Leu  Gly Thr Cys Asn Ile  Leu Ala Met
    1160                1165                1170

Glu Gly  Gly Ser Gly His Thr  Val Thr Gly Asn Ile  Asp His Phe
    1175                1180                1185

Phe Ser  Ser Pro Ser Ile Ser  Ser His Ile Pro Ser  Leu Ser Ile
    1190                1195                1200

Tyr Ser  Ala Ile Gly Ile Glu  Thr Glu Asn Leu Asp  Phe Ser Lys
    1205                1210                1215
```

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```
Lys Ile  Met Met Leu Pro Asn  Ala Pro Ser Arg Val  Phe Trp Trp
    1220                1225                1230

Glu Thr  Gly Ala Val Pro Gly  Leu Arg Ser Leu Glu  Asn Asp Gly
    1235                1240                1245

Thr Arg  Leu Leu Asp Ser Ile  Arg Asp Leu Tyr Pro  Gly Lys Phe
    1250                1255                1260

Tyr Trp  Arg Phe Tyr Ala Phe  Phe Asp Tyr Ala Ile  Thr Thr Leu
    1265                1270                1275

Lys Pro  Val Tyr Glu Asp Thr  Asn Ile Lys Ile Lys  Leu Asp Lys
    1280                1285                1290

Asp Thr  Arg Asn Phe Ile Met  Pro Thr Ile Thr Thr  Asn Glu Ile
    1295                1300                1305

Arg Asn  Lys Leu Ser Tyr Ser  Phe Asp Gly Ala Gly  Gly Thr Tyr
    1310                1315                1320

Ser Leu  Leu Leu Ser Ser Tyr  Pro Ile Ser Thr Asn  Ile Asn Leu
    1325                1330                1335

Ser Lys  Asp Asp Leu Trp Ile  Phe Asn Ile Asp Asn  Glu Val Arg
    1340                1345                1350

Glu Ile  Ser Ile Glu Asn Gly  Thr Ile Lys Lys Gly  Lys Leu Ile
    1355                1360                1365

Lys Asp  Val Leu Ser Lys Ile  Asp Ile Asn Lys Asn  Lys Leu Ile
    1370                1375                1380

Ile Gly  Asn Gln Thr Ile Asp  Phe Ser Gly Asp Ile  Asp Asn Lys
    1385                1390                1395

Asp Arg  Tyr Ile Phe Leu Thr  Cys Glu Leu Asp Asp  Lys Ile Ser
    1400                1405                1410
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Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

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Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asn Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

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Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

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Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe
2180 2185 2190

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Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
2330 2335 2340

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

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```
Gly Tyr  Thr Ser Ile Asn Gly  Lys His Phe Tyr Phe  Asn Thr Asp
    2390                2395                2400

Gly Ile  Met Gln Ile Gly Val  Phe Lys Gly Pro Asn  Gly Phe Glu
    2405                2410                2415

Tyr Phe  Ala Pro Ala Asn Thr  Asp Ala Asn Asn Ile  Glu Gly Gln
    2420                2425                2430

Ala Ile  Leu Tyr Gln Asn Lys  Phe Leu Thr Leu Asn  Gly Lys Lys
    2435                2440                2445

Tyr Tyr  Phe Gly Ser Asp Ser  Lys Ala Val Thr Gly  Leu Arg Thr
    2450                2455                2460

Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr Asn Thr  Ala Val Ala
    2465                2470                2475

Val Thr  Gly Trp Gln Thr Ile  Asn Gly Lys Lys Tyr  Tyr Phe Asn
    2480                2485                2490

Thr Asn  Thr Ser Ile Ala Ser  Thr Gly Tyr Thr Ile  Ile Ser Gly
    2495                2500                2505

Lys His  Phe Tyr Phe Asn Thr  Asp Gly Ile Met Gln  Ile Gly Val
    2510                2515                2520

Phe Lys  Gly Pro Asp Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr
    2525                2530                2535

Asp Ala  Asn Asn Ile Glu Gly  Gln Ala Ile Arg Tyr  Gln Asn Arg
    2540                2545                2550

Phe Leu  Tyr Leu His Asp Asn  Ile Tyr Tyr Phe Gly  Asn Asn Ser
    2555                2560                2565

Lys Ala  Ala Thr Gly Trp Val  Thr Ile Asp Gly Asn  Arg Tyr Tyr
    2570                2575                2580
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Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

<210> 310
<211> 2709
<212> PRT
<213> Artificial Sequence

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<223> Synthetic amino acid sequence

<400> 310

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr

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            20                  25                  30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Ala Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
```

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225 230 235 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Ala Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile

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435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Gln Ile Asn Ser Leu Ala Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
530 535 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545 550 555 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
565 570 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
580 585 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
595 600 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
610 615 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625 630 635 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys

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645 650 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
660 665 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
675 680 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
690 695 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705 710 715 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
725 730 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
740 745 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
755 760 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
770 775 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785 790 795 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
805 810 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
820 825 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
835 840 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu

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    850                 855                 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865                 870                 875                 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
                885                 890                 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
            900                 905                 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
        915                 920                 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
    930                 935                 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945                 950                 955                 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
                965                 970                 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
            980                 985                 990

Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Tyr Asp Ser  Ile Gln Leu
        995                 1000                1005

Val Asn  Leu Ile Ser Asn Ala  Val Asn Asp Thr Ile  Asn Val Leu
    1010                1015                1020

Pro Thr  Ile Thr Glu Gly Ile  Pro Ile Val Ser Thr  Ile Leu Asp
    1025                1030                1035

Gly Ile  Asn Leu Gly Ala Ala  Ile Lys Glu Leu Leu  Asp Glu His
    1040                1045                1050

Asp Pro  Leu Leu Lys Lys Glu  Leu Glu Ala Lys Val  Gly Val Leu
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1055 1060 1065

Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser Ile
1070 1075 1080

Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile Ala
1085 1090 1095

Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile
1100 1105 1110

Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu
1115 1120 1125

Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys
1130 1135 1140

Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly
1235 1240 1245

Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe

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1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile
1355 1360 1365

Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala

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1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Val Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val

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1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn

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1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr

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2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn

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2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
2330 2335 2340

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln

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2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn

2615 2620 2625

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

<210> 311
<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 311

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

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Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Ala Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270
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Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Ala Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

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Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Gln Ile Asn Ser Leu Ala Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
    530                 535                 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545                 550                 555                 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
        595                 600                 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
    610                 615                 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625                 630                 635                 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
                645                 650                 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
            660                 665                 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
        675                 680                 685
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```
Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
    690                 695                 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705                 710                 715                 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
                725                 730                 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
            740                 745                 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
        755                 760                 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
    770                 775                 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785                 790                 795                 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
                805                 810                 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
            820                 825                 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
        835                 840                 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
    850                 855                 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865                 870                 875                 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
                885                 890                 895
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```
Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
            900                 905                 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
        915                 920                 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
    930                 935                 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945                 950                 955                 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
                965                 970                 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
            980                 985                 990

Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Tyr Asp Ser  Ile Gln Leu
        995                 1000                1005

Val Asn  Leu Ile Ser Asn Ala  Val Asn Asp Thr Ile  Asn Val Leu
    1010                1015                1020

Pro Thr  Ile Thr Glu Gly Ile  Pro Ile Val Ser Thr  Ile Leu Asp
    1025                1030                1035

Gly Ile  Asn Leu Gly Ala Ala  Ile Lys Glu Leu Leu  Asp Glu His
    1040                1045                1050

Asp Pro  Leu Leu Lys Lys Glu  Leu Glu Ala Lys Val  Gly Val Leu
    1055                1060                1065

Ala Ile  Asn Met Ser Leu Ser  Ile Ala Ala Thr Val  Ala Ser Ile
    1070                1075                1080

Val Gly  Ile Gly Ala Glu Val  Thr Ile Phe Leu Leu  Pro Ile Ala
    1085                1090                1095
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Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile
1100 1105 1110

Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu
1115 1120 1125

Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys
1130 1135 1140

Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly
1235 1240 1245

Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys
1280 1285 1290

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Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile
1355 1360 1365

Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asn Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

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Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Gly Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

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Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

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Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

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Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

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Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
2330 2335 2340

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

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Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr Asn Thr  Ala Val Ala
    2465                2470                2475

Val Thr  Gly Trp Gln Thr Ile  Asn Gly Lys Lys Tyr  Tyr Phe Asn
    2480                2485                2490

Thr Asn  Thr Ser Ile Ala Ser  Thr Gly Tyr Thr Ile  Ile Ser Gly
    2495                2500                2505

Lys His  Phe Tyr Phe Asn Thr  Asp Gly Ile Met Gln  Ile Gly Val
    2510                2515                2520

Phe Lys  Gly Pro Asp Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr
    2525                2530                2535

Asp Ala  Asn Asn Ile Glu Gly  Gln Ala Ile Arg Tyr  Gln Asn Arg
    2540                2545                2550

Phe Leu  Tyr Leu His Asp Asn  Ile Tyr Tyr Phe Gly  Asn Asn Ser
    2555                2560                2565

Lys Ala  Ala Thr Gly Trp Val  Thr Ile Asp Gly Asn  Arg Tyr Tyr
    2570                2575                2580

Phe Glu  Pro Asn Thr Ala Met  Gly Ala Asn Gly Tyr  Lys Thr Ile
    2585                2590                2595

Asp Asn  Lys Asn Phe Tyr Phe  Arg Asn Gly Leu Pro  Gln Ile Gly
    2600                2605                2610

Val Phe  Lys Gly Ser Asn Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2615                2620                2625

Thr Asp  Ala Asn Asn Ile Glu  Gly Gln Ala Ile Arg  Tyr Gln Asn
    2630                2635                2640

Arg Phe  Leu His Leu Leu Gly  Lys Ile Tyr Tyr Phe  Gly Asn Asn
    2645                2650                2655
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Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

<210> 312
<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 312

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Ala Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr

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100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
130 135 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145 150 155 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
165 170 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
180 185 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
195 200 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
210 215 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225 230 235 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Ala Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys

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305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Gln Ile Asn Ser Leu Ala Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
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515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
530 535 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545 550 555 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
565 570 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
580 585 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
595 600 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
610 615 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625 630 635 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
645 650 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
660 665 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
675 680 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
690 695 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705 710 715 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile

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725 730 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
740 745 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
755 760 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
770 775 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785 790 795 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
805 810 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
820 825 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
835 840 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
850 855 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865 870 875 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
885 890 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
900 905 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
915 920 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn

930 935 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945 950 955 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
965 970 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
980 985 990

Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln Leu
995 1000 1005

Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val Leu
1010 1015 1020

Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu Asp
1025 1030 1035

Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu His
1040 1045 1050

Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val Leu
1055 1060 1065

Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser Ile
1070 1075 1080

Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile Ala
1085 1090 1095

Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile
1100 1105 1110

Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu
1115 1120 1125

Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys

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    1130                1135                1140

Ile Leu  Val Pro Ile Asp Asp  Leu Val Ile Ser Glu  Ile Asp Phe
    1145                1150                1155

Asn Asn  Asn Ser Ile Lys Leu  Gly Thr Cys Asn Ile  Leu Ala Met
    1160                1165                1170

Glu Gly  Gly Ser Gly His Thr  Val Thr Gly Asn Ile  Asp His Phe
    1175                1180                1185

Phe Ser  Ser Pro Ser Ile Ser  Ser His Ile Pro Ser  Leu Ser Ile
    1190                1195                1200

Tyr Ser  Ala Ile Gly Ile Glu  Thr Glu Asn Leu Asp  Phe Ser Lys
    1205                1210                1215

Lys Ile  Met Met Leu Pro Asn  Ala Pro Ser Arg Val  Phe Trp Trp
    1220                1225                1230

Glu Thr  Gly Ala Val Pro Gly  Leu Arg Ser Leu Glu  Asn Asp Gly
    1235                1240                1245

Thr Arg  Leu Leu Asp Ser Ile  Arg Asp Leu Tyr Pro  Gly Lys Phe
    1250                1255                1260

Tyr Trp  Arg Phe Tyr Ala Phe  Phe Asp Tyr Ala Ile  Thr Thr Leu
    1265                1270                1275

Lys Pro  Val Tyr Glu Asp Thr  Asn Ile Lys Ile Lys  Leu Asp Lys
    1280                1285                1290

Asp Thr  Arg Asn Phe Ile Met  Pro Thr Ile Thr Thr  Asn Glu Ile
    1295                1300                1305

Arg Asn  Lys Leu Ser Tyr Ser  Phe Asp Gly Ala Gly  Gly Thr Tyr
    1310                1315                1320

Ser Leu  Leu Leu Ser Ser Tyr  Pro Ile Ser Thr Asn  Ile Asn Leu
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1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile
1355 1360 1365

Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr

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1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn

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1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser

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1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala

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2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys

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2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
2330 2335 2340

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly

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2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys

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2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

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<213> Artificial Sequence

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<223> Synthetic amino acid sequence

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Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
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Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Ala Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
130 135 140

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Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Val Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350
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Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Gln Ile Asn Ser Leu Ala Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
    530                 535                 540

Asn Glu Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545                 550                 555                 560
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Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
        595                 600                 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
    610                 615                 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625                 630                 635                 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
                645                 650                 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
            660                 665                 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
        675                 680                 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
    690                 695                 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705                 710                 715                 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser Ile
                725                 730                 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
            740                 745                 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
        755                 760                 765
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Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
770 775 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785 790 795 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Thr Ser Val Ser Pro
805 810 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
820 825 830

Val Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
835 840 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
850 855 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865 870 875 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
885 890 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
900 905 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
915 920 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
930 935 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945 950 955 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
965 970 975

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Asp Leu Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
            980                 985                 990

Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Tyr Asp Ser  Ile Gln Leu
        995                 1000                1005

Val Asn  Leu Ile Ser Asn Ala  Val Asn Asp Thr Ile  Asn Val Leu
    1010                1015                1020

Pro Thr  Ile Thr Glu Gly Ile  Pro Ile Val Ser Thr  Ile Leu Asp
    1025                1030                1035

Gly Ile  Asn Leu Gly Ala Ala  Ile Lys Glu Leu Leu  Asp Glu His
    1040                1045                1050

Asp Pro  Leu Leu Lys Lys Glu  Leu Glu Ala Lys Val  Gly Val Leu
    1055                1060                1065

Ala Ile  Asn Met Ser Leu Ser  Ile Ala Ala Thr Val  Ala Ser Ile
    1070                1075                1080

Val Gly  Ile Gly Ala Glu Val  Thr Ile Phe Leu Leu  Pro Ile Ala
    1085                1090                1095

Gly Ile  Ser Ala Gly Ile Pro  Ser Leu Val Asn Asn  Glu Leu Ile
    1100                1105                1110

Leu His  Asp Lys Ala Thr Ser  Val Val Asn Tyr Phe  Asn His Leu
    1115                1120                1125

Ser Glu  Ser Lys Glu Tyr Gly  Pro Leu Lys Thr Glu  Asp Asp Lys
    1130                1135                1140

Ile Leu  Val Pro Ile Asp Asp  Leu Val Ile Ser Glu  Ile Asp Phe
    1145                1150                1155

Asn Asn  Asn Ala Ile Lys Leu  Gly Thr Cys Asn Ile  Leu Ala Met
    1160                1165                1170
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```
Glu Gly  Gly Ser Gly His Thr  Val Thr Gly Asn Ile  Asp His Phe
    1175                1180                1185

Phe Ser  Ser Pro Ser Ile Ser  Ser His Ile Pro Ser  Leu Ser Ile
    1190                1195                1200

Tyr Ser  Ala Ile Gly Ile Lys  Thr Glu Asn Leu Asp  Phe Ser Lys
    1205                1210                1215

Lys Ile  Met Met Leu Pro Asn  Ala Pro Ser Arg Val  Phe Trp Trp
    1220                1225                1230

Glu Thr  Gly Ala Val Pro Gly  Leu Arg Ser Leu Glu  Asn Asn Gly
    1235                1240                1245

Thr Lys  Leu Leu Asp Ser Ile  Arg Asp Leu Tyr Pro  Gly Lys Phe
    1250                1255                1260

Tyr Trp  Arg Phe Tyr Ala Phe  Phe Asp Tyr Ala Ile  Thr Thr Leu
    1265                1270                1275

Lys Pro  Val Tyr Glu Asp Thr  Asn Ile Lys Ile Lys  Leu Asp Lys
    1280                1285                1290

Asp Thr  Arg Asn Phe Ile Met  Pro Thr Ile Thr Thr  Asn Glu Ile
    1295                1300                1305

Arg Asn  Lys Leu Ser Tyr Ser  Phe Asp Gly Ala Gly  Gly Thr Tyr
    1310                1315                1320

Ser Leu  Leu Leu Ser Ser Tyr  Pro Ile Ser Thr Asn  Ile Asn Leu
    1325                1330                1335

Ser Lys  Asp Asp Leu Trp Ile  Phe Asn Ile Asp Asn  Glu Val Arg
    1340                1345                1350

Glu Ile  Ser Ile Glu Asn Gly  Thr Ile Lys Lys Gly  Lys Leu Ile
    1355                1360                1365
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Lys Asp  Val Leu Ser Lys Ile  Asp Ile Asn Lys Asn  Lys Leu Ile
    1370                1375                1380

Ile Gly  Asn Gln Thr Ile Asp  Phe Ser Gly Asp Ile  Asp Asn Lys
    1385                1390                1395

Asp Arg  Tyr Ile Phe Leu Thr  Cys Glu Leu Asp Asp  Lys Ile Ser
    1400                1405                1410

Leu Ile  Ile Glu Ile Asn Leu  Val Ala Lys Ser Tyr  Ser Leu Leu
    1415                1420                1425

Leu Ser  Gly Asp Lys Asn Tyr  Leu Ile Ser Asn Leu  Ser Asn Thr
    1430                1435                1440

Ile Glu  Lys Ile Asn Thr Leu  Gly Leu Asp Ser Lys  Asn Ile Ala
    1445                1450                1455

Tyr Asn  Tyr Thr Asp Glu Ser  Asn Asn Lys Tyr Phe  Gly Ala Ile
    1460                1465                1470

Ser Lys  Thr Ser Gln Lys Ser  Ile Ile His Tyr Lys  Lys Asp Ser
    1475                1480                1485

Lys Asn  Ile Leu Glu Phe Tyr  Asn Gly Ser Thr Leu  Glu Phe Asn
    1490                1495                1500

Ser Lys  Asp Phe Ile Ala Glu  Asp Ile Asn Val Phe  Met Lys Asp
    1505                1510                1515

Asp Ile  Asn Thr Ile Thr Gly  Lys Tyr Tyr Val Asp  Asn Asn Thr
    1520                1525                1530

Asp Lys  Ser Ile Asp Phe Ser  Ile Ser Leu Val Ser  Lys Asn Gln
    1535                1540                1545

Ala Lys  Val Asn Gly Leu Tyr  Leu Asn Glu Ser Val  Tyr Ser Ser
    1550                1555                1560
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```
Tyr Leu  Asp Phe Val Lys Asn  Ala Asp Gly His His  Asn Thr Ser
    1565                1570                1575

Asn Phe  Met Asn Leu Phe Leu  Asp Asn Ile Ser Phe  Trp Lys Leu
    1580                1585                1590

Phe Gly  Phe Glu Asn Ile Asn  Phe Val Val Asp Lys  Tyr Phe Thr
    1595                1600                1605

Leu Val  Gly Lys Thr Asn Leu  Gly Tyr Val Glu Phe  Ile Cys Asp
    1610                1615                1620

Asn Asn  Lys Asn Ile Asp Ile  Tyr Phe Gly Glu Trp  Lys Thr Ser
    1625                1630                1635

Ser Ser  Lys Ser Thr Ile Phe  Ser Gly Asn Gly Arg  Asn Val Val
    1640                1645                1650

Val Glu  Pro Ile Tyr Asn Pro  Asp Thr Gly Glu Asp  Ile Ser Thr
    1655                1660                1665

Ser Leu  Asp Phe Ser Tyr Glu  Pro Leu Tyr Gly Ile  Asp Arg Tyr
    1670                1675                1680

Ile Asn  Lys Val Leu Ile Ala  Pro Asp Leu Tyr Thr  Ser Leu Ile
    1685                1690                1695

Asn Ile  Asn Thr Asn Tyr Tyr  Ser Asn Glu Tyr Tyr  Pro Glu Ile
    1700                1705                1710

Ile Val  Leu Asn Pro Asn Thr  Phe His Lys Lys Val  Asn Ile Asn
    1715                1720                1725

Leu Asp  Ser Ser Ser Phe Glu  Tyr Lys Trp Ser Thr  Glu Gly Ser
    1730                1735                1740

Asp Phe  Ile Leu Val Arg Tyr  Leu Glu Glu Ser Asn  Lys Lys Ile
    1745                1750                1755
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Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Val Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Ala Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Ser Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asn Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Arg Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

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Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

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```
His Phe  Tyr Phe Asn Thr Asp  Gly Ile Met Gln Ile  Gly Val Phe
    2150                2155                2160

Lys Gly  Pro Asn Gly Phe Glu  Tyr Phe Ala Pro Ala  Asn Thr Asp
    2165                2170                2175

Ala Asn  Asn Ile Glu Gly Gln  Ala Ile Leu Tyr Gln  Asn Lys Phe
    2180                2185                2190

Leu Thr  Leu Asn Gly Lys Lys  Tyr Tyr Phe Ala Ser  Asp Ser Lys
    2195                2200                2205

Ala Val  Thr Gly Trp Arg Ile  Ile Asn Asn Lys Lys  Tyr Tyr Phe
    2210                2215                2220

Asn Pro  Asn Asn Ala Ile Ala  Ala Thr His Leu Tyr  Thr Ile Asn
    2225                2230                2235

Asn Asp  Lys Tyr Tyr Phe Ser  Tyr Asp Gly Ile Leu  Gln Asn Gly
    2240                2245                2250

Tyr Ile  Thr Ile Glu Arg Asn  Asn Phe Tyr Phe Asp  Ala Asn Asn
    2255                2260                2265

Glu Ser  Lys Met Val Thr Gly  Val Phe Lys Gly Pro  Asn Gly Phe
    2270                2275                2280

Glu Tyr  Phe Ala Pro Ala Asn  Thr His Asn Asn Asn  Ile Glu Gly
    2285                2290                2295

Gln Ala  Ile Val Tyr Gln Asn  Lys Phe Leu Thr Leu  Asn Gly Lys
    2300                2305                2310

Lys Tyr  Tyr Phe Asp Asn Asp  Ser Lys Ala Val Thr  Gly Trp Gln
    2315                2320                2325

Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn Leu Asn  Thr Ala Val
    2330                2335                2340
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Ala Val Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Ala Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Ala Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

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Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Arg Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Ile Gly Ala Asn Gly Tyr Lys Ile Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Asn Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Asn Met Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

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<211> 2709
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<213> Artificial Sequence

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<223> Synthetic amino acid sequence

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Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
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Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
            20                  25                  30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Ala Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
```

180 185 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
195 200 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
210 215 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225 230 235 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Ala Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln

385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Gln Ile Asn Ser Leu Ala Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
530 535 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545 550 555 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
565 570 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
580 585 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile

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595 600 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
610 615 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625 630 635 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
645 650 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
660 665 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
675 680 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
690 695 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705 710 715 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
725 730 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
740 745 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
755 760 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
770 775 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785 790 795 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro

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805 810 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
820 825 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
835 840 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
850 855 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865 870 875 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
885 890 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
900 905 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
915 920 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
930 935 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945 950 955 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
965 970 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
980 985 990

Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln Leu
995 1000 1005

Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val Leu

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1010 1015 1020

Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu Asp
1025 1030 1035

Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu His
1040 1045 1050

Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val Leu
1055 1060 1065

Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser Ile
1070 1075 1080

Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile Ala
1085 1090 1095

Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile
1100 1105 1110

Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu
1115 1120 1125

Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys
1130 1135 1140

Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser Lys

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1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly
1235 1240 1245

Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile
1355 1360 1365

Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser

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1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr

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1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn

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1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp

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1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe

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2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
2330 2335 2340

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr

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2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr

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2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

<210> 315
<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 315

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

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Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
            20                  25                  30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Ala Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Val Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
    210                 215                 220
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Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430
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```
Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Gln Ile Asn Ser Leu Ala Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
    530                 535                 540

Asn Glu Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545                 550                 555                 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
        595                 600                 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
    610                 615                 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625                 630                 635                 640
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Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
                645                 650                 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
            660                 665                 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
        675                 680                 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
    690                 695                 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705                 710                 715                 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser Ile
                725                 730                 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
            740                 745                 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
        755                 760                 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
    770                 775                 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785                 790                 795                 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Thr Ser Val Ser Pro
                805                 810                 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
            820                 825                 830

Val Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
        835                 840                 845
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```
Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
    850                 855                 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865                 870                 875                 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
                885                 890                 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
            900                 905                 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
        915                 920                 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
    930                 935                 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945                 950                 955                 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
                965                 970                 975

Asp Leu Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
            980                 985                 990

Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Tyr Asp Ser  Ile Gln Leu
        995                 1000                1005

Val Asn  Leu Ile Ser Asn Ala  Val Asn Asp Thr Ile  Asn Val Leu
    1010                1015                1020

Pro Thr  Ile Thr Glu Gly Ile  Pro Ile Val Ser Thr  Ile Leu Asp
    1025                1030                1035

Gly Ile  Asn Leu Gly Ala Ala  Ile Lys Glu Leu Leu  Asp Glu His
    1040                1045                1050
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```
Asp Pro  Leu Leu Lys Lys Glu  Leu Glu Ala Lys Val  Gly Val Leu
    1055                1060                1065

Ala Ile  Asn Met Ser Leu Ser  Ile Ala Ala Thr Val  Ala Ser Ile
    1070                1075                1080

Val Gly  Ile Gly Ala Glu Val  Thr Ile Phe Leu Leu  Pro Ile Ala
    1085                1090                1095

Gly Ile  Ser Ala Gly Ile Pro  Ser Leu Val Asn Asn  Glu Leu Ile
    1100                1105                1110

Leu His  Asp Lys Ala Thr Ser  Val Val Asn Tyr Phe  Asn His Leu
    1115                1120                1125

Ser Glu  Ser Lys Glu Tyr Gly  Pro Leu Lys Thr Glu  Asp Asp Lys
    1130                1135                1140

Ile Leu  Val Pro Ile Asp Asp  Leu Val Ile Ser Glu  Ile Asp Phe
    1145                1150                1155

Asn Asn  Asn Ala Ile Lys Leu  Gly Thr Cys Asn Ile  Leu Ala Met
    1160                1165                1170

Glu Gly  Gly Ser Gly His Thr  Val Thr Gly Asn Ile  Asp His Phe
    1175                1180                1185

Phe Ser  Ser Pro Ser Ile Ser  Ser His Ile Pro Ser  Leu Ser Ile
    1190                1195                1200

Tyr Ser  Ala Ile Gly Ile Lys  Thr Glu Asn Leu Asp  Phe Ser Lys
    1205                1210                1215

Lys Ile  Met Met Leu Pro Asn  Ala Pro Ser Arg Val  Phe Trp Trp
    1220                1225                1230

Glu Thr  Gly Ala Val Pro Gly  Leu Arg Ser Leu Glu  Asn Asn Gly
    1235                1240                1245
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Thr Lys  Leu Leu Asp Ser Ile  Arg Asp Leu Tyr Pro  Gly Lys Phe
    1250                1255                1260

Tyr Trp  Arg Phe Tyr Ala Phe  Phe Asp Tyr Ala Ile  Thr Thr Leu
    1265                1270                1275

Lys Pro  Val Tyr Glu Asp Thr  Asn Ile Lys Ile Lys  Leu Asp Lys
    1280                1285                1290

Asp Thr  Arg Asn Phe Ile Met  Pro Thr Ile Thr Thr  Asn Glu Ile
    1295                1300                1305

Arg Asn  Lys Leu Ser Tyr Ser  Phe Asp Gly Ala Gly  Gly Thr Tyr
    1310                1315                1320

Ser Leu  Leu Leu Ser Ser Tyr  Pro Ile Ser Thr Asn  Ile Asn Leu
    1325                1330                1335

Ser Lys  Asp Asp Leu Trp Ile  Phe Asn Ile Asp Asn  Glu Val Arg
    1340                1345                1350

Glu Ile  Ser Ile Glu Asn Gly  Thr Ile Lys Lys Gly  Lys Leu Ile
    1355                1360                1365

Lys Asp  Val Leu Ser Lys Ile  Asp Ile Asn Lys Asn  Lys Leu Ile
    1370                1375                1380

Ile Gly  Asn Gln Thr Ile Asp  Phe Ser Gly Asp Ile  Asp Asn Lys
    1385                1390                1395

Asp Arg  Tyr Ile Phe Leu Thr  Cys Glu Leu Asp Asp  Lys Ile Ser
    1400                1405                1410

Leu Ile  Ile Glu Ile Asn Leu  Val Ala Lys Ser Tyr  Ser Leu Leu
    1415                1420                1425

Leu Ser  Gly Asp Lys Asn Tyr  Leu Ile Ser Asn Leu  Ser Asn Thr
    1430                1435                1440
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Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Gly Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Ala Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ala Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Val Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

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```
Ser Ser  Lys Ser Thr Ile Phe  Ser Gly Asn Gly Arg  Asn Val Val
    1640                1645                1650

Val Glu  Pro Ile Tyr Asn Pro  Asp Thr Gly Glu Asp  Ile Ser Thr
    1655                1660                1665

Ser Leu  Asp Phe Ser Tyr Glu  Pro Leu Tyr Gly Ile  Asp Arg Tyr
    1670                1675                1680

Ile Asn  Lys Val Leu Ile Ala  Pro Asp Leu Tyr Thr  Ser Leu Ile
    1685                1690                1695

Asn Ile  Asn Thr Asn Tyr Tyr  Ser Asn Glu Tyr Tyr  Pro Glu Ile
    1700                1705                1710

Ile Val  Leu Asn Pro Asn Thr  Phe His Lys Lys Val  Asn Ile Asn
    1715                1720                1725

Leu Asp  Ser Ser Ser Phe Glu  Tyr Lys Trp Ser Thr  Glu Gly Ser
    1730                1735                1740

Asp Phe  Ile Leu Val Arg Tyr  Leu Glu Glu Ser Asn  Lys Lys Ile
    1745                1750                1755

Leu Gln  Lys Ile Arg Ile Lys  Gly Ile Leu Ser Asn  Thr Gln Ser
    1760                1765                1770

Phe Asn  Lys Met Ser Ile Asp  Phe Lys Asp Ile Lys  Lys Leu Ser
    1775                1780                1785

Leu Val  Tyr Ile Met Ser Asn  Phe Lys Ser Phe Asn  Ser Glu Asn
    1790                1795                1800

Glu Leu  Asp Arg Asp His Leu  Gly Phe Lys Ile Ile  Asp Asn Lys
    1805                1810                1815

Thr Tyr  Tyr Tyr Asp Glu Ala  Ser Lys Leu Val Lys  Gly Leu Ile
    1820                1825                1830
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Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Ser Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asn Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Arg Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

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Phe Ser Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Lys Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Ala Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

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Asn Pro Asn Asn Ala Ile Ala Ala Thr His Leu Tyr Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Val
2330 2335 2340

Ala Val Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2405 2410 2415

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Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Ala Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala
2465 2470 2475

Ala Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Arg Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Ile Gly Ala Asn Gly Tyr Lys Ile Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

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Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Asn Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Asn Met Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
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Ala Pro Gly Ile Tyr Gly
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Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
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Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser

50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Ala Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
130 135 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145 150 155 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
165 170 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
180 185 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
195 200 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
210 215 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225 230 235 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu

260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Ala Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile

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465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Gln Ile Asn Ser Leu Ala Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
    530                 535                 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545                 550                 555                 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
        595                 600                 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
    610                 615                 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625                 630                 635                 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
                645                 650                 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
            660                 665                 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
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675 680 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
690 695 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705 710 715 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
725 730 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
740 745 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
755 760 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
770 775 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785 790 795 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
805 810 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
820 825 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
835 840 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
850 855 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865 870 875 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr

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                885                 890                 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
            900                 905                 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
        915                 920                 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
    930                 935                 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945                 950                 955                 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
                965                 970                 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
            980                 985                 990

Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Tyr Asp Ser  Ile Gln Leu
        995                 1000                1005

Val Asn  Leu Ile Ser Asn Ala  Val Asn Asp Thr Ile  Asn Val Leu
    1010                1015                1020

Pro Thr  Ile Thr Glu Gly Ile  Pro Ile Val Ser Thr  Ile Leu Asp
    1025                1030                1035

Gly Ile  Asn Leu Gly Ala Ala  Ile Lys Glu Leu Leu  Asp Glu His
    1040                1045                1050

Asp Pro  Leu Leu Lys Lys Glu  Leu Glu Ala Lys Val  Gly Val Leu
    1055                1060                1065

Ala Ile  Asn Met Ser Leu Ser  Ile Ala Ala Thr Val  Ala Ser Ile
    1070                1075                1080

Val Gly  Ile Gly Ala Glu Val  Thr Ile Phe Leu Leu  Pro Ile Ala
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1085 1090 1095

Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile
1100 1105 1110

Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu
1115 1120 1125

Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys
1130 1135 1140

Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly
1235 1240 1245

Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys

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1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile
1355 1360 1365

Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser

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1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr

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1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn

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1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser

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2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn

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2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
2330 2335 2340

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr

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2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn

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2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
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Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

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His Phe Val Ala Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Val Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300
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Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510
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Gln Ile Asn Ser Leu Ala Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
530 535 540

Asn Glu Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545 550 555 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
565 570 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
580 585 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
595 600 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
610 615 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625 630 635 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
645 650 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
660 665 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
675 680 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
690 695 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705 710 715 720

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Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser Ile
725 730 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
740 745 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
755 760 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
770 775 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785 790 795 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Thr Ser Val Ser Pro
805 810 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
820 825 830

Val Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
835 840 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
850 855 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865 870 875 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
885 890 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
900 905 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
915 920 925

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Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
    930                 935                 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945                 950                 955                 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
                965                 970                 975

Asp Leu Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
            980                 985                 990

Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Tyr Asp Ser  Ile Gln Leu
        995                 1000                1005

Val Asn  Leu Ile Ser Asn Ala  Val Asn Asp Thr Ile  Asn Val Leu
    1010                1015                1020

Pro Thr  Ile Thr Glu Gly Ile  Pro Ile Val Ser Thr  Ile Leu Asp
    1025                1030                1035

Gly Ile  Asn Leu Gly Ala Ala  Ile Lys Glu Leu Leu  Asp Glu His
    1040                1045                1050

Asp Pro  Leu Leu Lys Lys Glu  Leu Glu Ala Lys Val  Gly Val Leu
    1055                1060                1065

Ala Ile  Asn Met Ser Leu Ser  Ile Ala Ala Thr Val  Ala Ser Ile
    1070                1075                1080

Val Gly  Ile Gly Ala Glu Val  Thr Ile Phe Leu Leu  Pro Ile Ala
    1085                1090                1095

Gly Ile  Ser Ala Gly Ile Pro  Ser Leu Val Asn Asn  Glu Leu Ile
    1100                1105                1110

Leu His  Asp Lys Ala Thr Ser  Val Val Asn Tyr Phe  Asn His Leu
    1115                1120                1125
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Ser Glu Ser Lys Glu Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys
1130 1135 1140

Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ala Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Lys Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asn Gly
1235 1240 1245

Thr Lys Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

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Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile
1355 1360 1365

Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Gly Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

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Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Ala Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ala Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Val Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

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Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Val Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Ala Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Ser Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asn Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Arg Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

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Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

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Asp Gly  Lys Lys Tyr Tyr Phe  Asn Thr Asn Thr Ala  Glu Ala Ala
    2105                 2110                 2115

Thr Gly  Trp Gln Thr Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr
    2120                 2125                 2130

Asn Thr  Ser Ile Ala Ser Thr  Gly Tyr Thr Ile Ile  Asn Gly Lys
    2135                 2140                 2145

His Phe  Tyr Phe Asn Thr Asp  Gly Ile Met Gln Ile  Gly Val Phe
    2150                 2155                 2160

Lys Gly  Pro Asn Gly Phe Glu  Tyr Phe Ala Pro Ala  Asn Thr Asp
    2165                 2170                 2175

Ala Asn  Asn Ile Glu Gly Gln  Ala Ile Leu Tyr Gln  Asn Lys Phe
    2180                 2185                 2190

Leu Thr  Leu Asn Gly Lys Lys  Tyr Tyr Phe Ala Ser  Asp Ser Lys
    2195                 2200                 2205

Ala Val  Thr Gly Trp Arg Ile  Ile Asn Asn Lys Lys  Tyr Tyr Phe
    2210                 2215                 2220

Asn Pro  Asn Asn Ala Ile Ala  Ala Thr His Leu Tyr  Thr Ile Asn
    2225                 2230                 2235

Asn Asp  Lys Tyr Tyr Phe Ser  Tyr Asp Gly Ile Leu  Gln Asn Gly
    2240                 2245                 2250

Tyr Ile  Thr Ile Glu Arg Asn  Asn Phe Tyr Phe Asp  Ala Asn Asn
    2255                 2260                 2265

Glu Ser  Lys Met Val Thr Gly  Val Phe Lys Gly Pro  Asn Gly Phe
    2270                 2275                 2280

Glu Tyr  Phe Ala Pro Ala Asn  Thr His Asn Asn Asn  Ile Glu Gly
    2285                 2290                 2295
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Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Val
2330 2335 2340

Ala Val Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Ala Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

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Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Arg Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Ile Gly Ala Asn Gly Tyr Lys Ile Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Asn Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Asn Met Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

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Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

<210> 318
<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 318

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Ala Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val

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    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Val Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
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340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Gln Ile Asn Ser Leu Ala Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
530 535 540

Asn Glu Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu

545 550 555 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
565 570 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
580 585 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
595 600 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
610 615 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625 630 635 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
645 650 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
660 665 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
675 680 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
690 695 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705 710 715 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser Ile
725 730 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
740 745 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala

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        755                 760                 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
    770                 775                 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785                 790                 795                 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Thr Ser Val Ser Pro
                805                 810                 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
            820                 825                 830

Val Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
        835                 840                 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
    850                 855                 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865                 870                 875                 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
                885                 890                 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
            900                 905                 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
        915                 920                 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
    930                 935                 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945                 950                 955                 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
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965 970 975

Asp Leu Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
980 985 990

Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln Leu
995 1000 1005

Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val Leu
1010 1015 1020

Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu Asp
1025 1030 1035

Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu His
1040 1045 1050

Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val Leu
1055 1060 1065

Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser Ile
1070 1075 1080

Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile Ala
1085 1090 1095

Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile
1100 1105 1110

Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu
1115 1120 1125

Ser Glu Ser Lys Glu Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys
1130 1135 1140

Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ala Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met

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1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Lys Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asn Gly
1235 1240 1245

Thr Lys Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile

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1355 1360 1365

Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Gly Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Ala Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser

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1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ala Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Val Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile

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1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Val Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Ala Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Ser Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asn Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Arg Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr

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1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys

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2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Lys Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Ala Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Thr His Leu Tyr Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Val

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2330 2335 2340

Ala Val Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Ala Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr

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2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Arg Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Ile Gly Ala Asn Gly Tyr Lys Ile Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Asn Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Asn Met Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

<210> 319

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<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 319

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Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
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Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
            20                  25                  30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Ala Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175
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Ile Tyr Asp Arg Gln Lys Arg Phe Val Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380
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Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Gln Ile Asn Ser Leu Ala Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
    530                 535                 540

Asn Glu Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545                 550                 555                 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590
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Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
595 600 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
610 615 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625 630 635 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
645 650 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
660 665 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
675 680 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
690 695 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705 710 715 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser Ile
725 730 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
740 745 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
755 760 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
770 775 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785 790 795 800

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```
Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Thr Ser Val Ser Pro
                805                 810                 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
            820                 825                 830

Val Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
        835                 840                 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
    850                 855                 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865                 870                 875                 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
                885                 890                 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
            900                 905                 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
        915                 920                 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
    930                 935                 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945                 950                 955                 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
                965                 970                 975

Asp Leu Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
            980                 985                 990

Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Tyr Asp Ser  Ile Gln Leu
        995                 1000                1005
```

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Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val Leu
1010 1015 1020

Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu Asp
1025 1030 1035

Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu His
1040 1045 1050

Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val Leu
1055 1060 1065

Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser Ile
1070 1075 1080

Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile Ala
1085 1090 1095

Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile
1100 1105 1110

Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu
1115 1120 1125

Ser Glu Ser Lys Glu Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys
1130 1135 1140

Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ala Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
1190 1195 1200

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Tyr Ser Ala Ile Gly Ile Lys Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asn Gly
1235 1240 1245

Thr Lys Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile
1355 1360 1365

Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

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Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Gly Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Ala Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ala Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

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```
Phe Gly  Phe Glu Asn Ile Asn  Phe Val Val Asp Lys  Tyr Phe Thr
    1595                1600                1605

Leu Val  Gly Lys Thr Asn Leu  Gly Tyr Val Glu Phe  Ile Cys Asp
    1610                1615                1620

Asn Asn  Lys Asn Ile Asp Ile  Tyr Phe Gly Glu Trp  Lys Thr Ser
    1625                1630                1635

Ser Ser  Lys Ser Thr Ile Phe  Ser Gly Asn Gly Arg  Asn Val Val
    1640                1645                1650

Val Glu  Pro Ile Tyr Asn Pro  Asp Thr Gly Glu Asp  Ile Ser Thr
    1655                1660                1665

Ser Leu  Asp Phe Ser Tyr Glu  Pro Leu Tyr Gly Ile  Asp Arg Tyr
    1670                1675                1680

Ile Asn  Lys Val Leu Ile Ala  Pro Asp Leu Tyr Thr  Ser Leu Ile
    1685                1690                1695

Asn Ile  Asn Thr Asn Tyr Tyr  Ser Asn Glu Tyr Tyr  Pro Glu Ile
    1700                1705                1710

Ile Val  Leu Asn Pro Asn Thr  Phe His Lys Lys Val  Asn Ile Asn
    1715                1720                1725

Leu Asp  Ser Ser Ser Phe Glu  Tyr Lys Trp Ser Thr  Glu Gly Ser
    1730                1735                1740

Asp Phe  Ile Leu Val Arg Tyr  Leu Glu Glu Ser Asn  Lys Lys Ile
    1745                1750                1755

Leu Gln  Lys Ile Arg Ile Lys  Gly Ile Leu Ser Asn  Thr Gln Ser
    1760                1765                1770

Phe Asn  Lys Met Ser Ile Asp  Phe Lys Asp Ile Lys  Lys Leu Ser
    1775                1780                1785
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Leu Val Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Ala Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Ser Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asn Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Arg Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

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```
Ser Lys  Gly Trp Gln Thr Val  Asn Gly Ser Arg Tyr  Tyr Phe Asp
    1985                1990                1995

Thr Asp  Thr Ala Ile Ala Phe  Asn Gly Tyr Lys Thr  Ile Asp Gly
    2000                2005                2010

Lys His  Phe Tyr Phe Asp Ser  Asp Cys Val Val Lys  Ile Gly Val
    2015                2020                2025

Phe Ser  Gly Ser Asn Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr
    2030                2035                2040

Tyr Asn  Asn Asn Ile Glu Gly  Gln Ala Ile Val Tyr  Gln Ser Lys
    2045                2050                2055

Phe Leu  Thr Leu Asn Gly Lys  Lys Tyr Tyr Phe Asp  Asn Asn Ser
    2060                2065                2070

Lys Ala  Val Thr Gly Trp Gln  Thr Ile Asp Ser Lys  Lys Tyr Tyr
    2075                2080                2085

Phe Asn  Thr Asn Thr Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile
    2090                2095                2100

Asp Gly  Lys Lys Tyr Tyr Phe  Asn Thr Asn Thr Ala  Glu Val Ala
    2105                2110                2115

Thr Gly  Trp Gln Thr Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr
    2120                2125                2130

Asn Thr  Ser Ile Ala Ser Thr  Gly Tyr Thr Ile Ile  Asn Gly Lys
    2135                2140                2145

His Phe  Tyr Phe Asn Thr Asp  Gly Ile Met Gln Ile  Gly Val Phe
    2150                2155                2160

Lys Gly  Pro Asp Gly Phe Glu  Tyr Phe Ala Pro Ala  Asn Thr Asp
    2165                2170                2175
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Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Lys Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Ala Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Thr His Leu Tyr Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Val
2330 2335 2340

Ala Val Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

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```
Gly Lys  Lys Tyr Tyr Phe Asn  Thr Asn Thr Ser Ile  Ala Ser Thr
    2375                 2380                 2385

Gly Tyr  Thr Ile Ile Asn Gly  Lys His Phe Tyr Phe  Asn Thr Asp
    2390                 2395                 2400

Gly Ile  Met Gln Ile Gly Val  Phe Lys Gly Pro Asp  Gly Phe Glu
    2405                 2410                 2415

Tyr Phe  Ala Pro Ala Asn Thr  Asp Ala Asn Asn Ile  Glu Gly Gln
    2420                 2425                 2430

Ala Ile  Leu Tyr Gln Asn Lys  Phe Leu Thr Leu Asn  Gly Lys Lys
    2435                 2440                 2445

Tyr Tyr  Phe Ala Ser Asp Ser  Lys Ala Val Thr Gly  Leu Arg Thr
    2450                 2455                 2460

Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr Asn Thr  Ala Glu Ala
    2465                 2470                 2475

Ala Thr  Gly Trp Gln Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn
    2480                 2485                 2490

Thr Asn  Thr Ser Ile Ala Ser  Thr Gly Tyr Thr Ile  Ile Asn Asp
    2495                 2500                 2505

Lys His  Phe Tyr Phe Asn Thr  Asp Gly Ile Met Gln  Ile Gly Val
    2510                 2515                 2520

Phe Lys  Gly Pro Asp Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr
    2525                 2530                 2535

Asp Ala  Asn Asn Ile Glu Gly  Gln Ala Ile Arg Tyr  Gln Asn Arg
    2540                 2545                 2550

Phe Leu  Tyr Leu His Asp Asn  Ile Tyr Tyr Phe Gly  Asn Asn Ser
    2555                 2560                 2565
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Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Arg Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Ile Gly Ala Asn Gly Tyr Lys Ile Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Asn Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Asn Met Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

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<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

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Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
            20                  25                  30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Ala Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
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210 215 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225 230 235 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Gly
245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Ala Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser

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420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Gln Ile Asn Ser Leu Ala Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
530 535 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545 550 555 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
565 570 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
580 585 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
595 600 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
610 615 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg

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625 630 635 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
645 650 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
660 665 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
675 680 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
690 695 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705 710 715 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
725 730 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
740 745 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
755 760 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
770 775 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785 790 795 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
805 810 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
820 825 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile

835 840 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
850 855 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865 870 875 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
885 890 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
900 905 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
915 920 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
930 935 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945 950 955 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
965 970 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
980 985 990

Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln Leu
995 1000 1005

Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val Leu
1010 1015 1020

Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu Asp
1025 1030 1035

Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu His

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1040 1045 1050

Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val Leu
1055 1060 1065

Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser Ile
1070 1075 1080

Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile Ala
1085 1090 1095

Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile
1100 1105 1110

Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu
1115 1120 1125

Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys
1130 1135 1140

Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly

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1235 1240 1245

Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile
1355 1360 1365

Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Ile

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1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser

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1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile

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1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Ile Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val

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2015 2020 2025

Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe

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2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
2330 2335 2340

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu

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2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly

2600 2605 2610

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

<210> 321
<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 321

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
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Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

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Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Ala Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Val Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255
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Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460
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Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Gln Ile Asn Ser Leu Ala Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
    530                 535                 540

Asn Glu Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545                 550                 555                 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
        595                 600                 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
    610                 615                 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625                 630                 635                 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
                645                 650                 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
            660                 665                 670
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Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
675 680 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
690 695 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705 710 715 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser Ile
725 730 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
740 745 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
755 760 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
770 775 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785 790 795 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Thr Ser Val Ser Pro
805 810 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
820 825 830

Val Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
835 840 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
850 855 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865 870 875 880

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```
Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
                885                 890                 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
            900                 905                 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
        915                 920                 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
    930                 935                 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945                 950                 955                 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
                965                 970                 975

Asp Leu Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
            980                 985                 990

Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Tyr Asp Ser  Ile Gln Leu
        995                 1000                1005

Val Asn  Leu Ile Ser Asn Ala  Val Asn Asp Thr Ile  Asn Val Leu
    1010                1015                1020

Pro Thr  Ile Thr Glu Gly Ile  Pro Ile Val Ser Thr  Ile Leu Asp
    1025                1030                1035

Gly Ile  Asn Leu Gly Ala Ala  Ile Lys Glu Leu Leu  Asp Glu His
    1040                1045                1050

Asp Pro  Leu Leu Lys Lys Glu  Leu Glu Ala Lys Val  Gly Val Leu
    1055                1060                1065

Ala Ile  Asn Met Ser Leu Ser  Ile Ala Ala Thr Val  Ala Ser Ile
    1070                1075                1080
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Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile Ala
1085 1090 1095

Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile
1100 1105 1110

Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu
1115 1120 1125

Ser Glu Ser Lys Glu Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys
1130 1135 1140

Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ala Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Lys Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asn Gly
1235 1240 1245

Thr Lys Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

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Lys Pro  Val Tyr Glu Asp Thr  Asn Ile Lys Ile Lys  Leu Asp Lys
    1280                1285                1290

Asp Thr  Arg Asn Phe Ile Met  Pro Thr Ile Thr Thr  Asn Glu Ile
    1295                1300                1305

Arg Asn  Lys Leu Ser Tyr Ser  Phe Asp Gly Ala Gly  Gly Thr Tyr
    1310                1315                1320

Ser Leu  Leu Leu Ser Ser Tyr  Pro Ile Ser Thr Asn  Ile Asn Leu
    1325                1330                1335

Ser Lys  Asp Asp Leu Trp Ile  Phe Asn Ile Asp Asn  Glu Val Arg
    1340                1345                1350

Glu Ile  Ser Ile Glu Asn Gly  Thr Ile Lys Lys Gly  Lys Leu Ile
    1355                1360                1365

Lys Asp  Val Leu Ser Lys Ile  Asp Ile Asn Lys Asn  Lys Leu Ile
    1370                1375                1380

Ile Gly  Asn Gln Thr Ile Asp  Phe Ser Gly Asp Ile  Asp Asn Lys
    1385                1390                1395

Asp Arg  Tyr Ile Phe Leu Thr  Cys Glu Leu Asp Asp  Lys Ile Ser
    1400                1405                1410

Leu Ile  Ile Glu Ile Asn Leu  Val Ala Lys Ser Tyr  Ser Leu Leu
    1415                1420                1425

Leu Ser  Gly Asp Lys Asn Tyr  Leu Ile Ser Asn Leu  Ser Asn Thr
    1430                1435                1440

Ile Glu  Lys Ile Asn Thr Leu  Gly Leu Asp Ser Lys  Asn Ile Ala
    1445                1450                1455

Tyr Asn  Tyr Thr Asp Glu Ser  Asn Asn Lys Tyr Phe  Gly Ala Ile
    1460                1465                1470
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Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Gly Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Ala Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ala Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Val Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

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Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Val Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Ala Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Ser Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

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Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asn Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Arg Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

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Phe Leu  Thr Leu Asn Gly Lys  Lys Tyr Tyr Phe Asp  Asn Asn Ser
    2060                2065                2070

Lys Ala  Val Thr Gly Trp Gln  Thr Ile Asp Ser Lys  Lys Tyr Tyr
    2075                2080                2085

Phe Asn  Thr Asn Thr Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile
    2090                2095                2100

Asp Gly  Lys Lys Tyr Tyr Phe  Asn Thr Asn Thr Ala  Glu Ala Ala
    2105                2110                2115

Thr Gly  Trp Gln Thr Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr
    2120                2125                2130

Asn Thr  Ser Ile Ala Ser Thr  Gly Tyr Thr Ile Ile  Asn Gly Lys
    2135                2140                2145

His Phe  Tyr Phe Asn Thr Asp  Gly Ile Met Gln Ile  Gly Val Phe
    2150                2155                2160

Lys Gly  Pro Asp Gly Phe Glu  Tyr Phe Ala Pro Ala  Asn Thr Asp
    2165                2170                2175

Ala Asn  Asn Ile Glu Gly Gln  Ala Ile Leu Tyr Gln  Asn Lys Phe
    2180                2185                2190

Leu Thr  Leu Asn Gly Lys Lys  Tyr Tyr Phe Ala Ser  Asp Ser Lys
    2195                2200                2205

Ala Val  Thr Gly Trp Arg Ile  Ile Asn Asn Lys Lys  Tyr Tyr Phe
    2210                2215                2220

Asn Pro  Asn Asn Ala Ile Ala  Ala Thr His Leu Tyr  Thr Ile Asn
    2225                2230                2235

Asn Asp  Lys Tyr Tyr Phe Ser  Tyr Asp Gly Ile Leu  Gln Asn Gly
    2240                2245                2250
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Tyr Ile  Thr Ile Glu Arg Asn  Asn Phe Tyr Phe Asp  Ala Asn Asn
    2255                2260                2265

Glu Ser  Lys Met Val Thr Gly  Val Phe Lys Gly Pro  Asn Gly Phe
    2270                2275                2280

Glu Tyr  Phe Ala Pro Ala Asn  Thr His Asn Asn Asn  Ile Glu Gly
    2285                2290                2295

Gln Ala  Ile Val Tyr Gln Asn  Lys Phe Leu Thr Leu  Asn Gly Lys
    2300                2305                2310

Lys Tyr  Tyr Phe Asp Asn Asp  Ser Lys Ala Val Thr  Gly Trp Gln
    2315                2320                2325

Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn Leu Asn  Thr Ala Val
    2330                2335                2340

Ala Val  Thr Gly Trp Gln Thr  Ile Asp Gly Lys Lys  Tyr Tyr Phe
    2345                2350                2355

Asn Leu  Asn Thr Ala Glu Ala  Ala Thr Gly Trp Gln  Thr Ile Asp
    2360                2365                2370

Gly Lys  Lys Tyr Tyr Phe Asn  Thr Asn Thr Phe Ile  Ala Ser Thr
    2375                2380                2385

Gly Tyr  Thr Ser Ile Asn Gly  Lys His Phe Tyr Phe  Asn Thr Asp
    2390                2395                2400

Gly Ile  Met Gln Ile Gly Val  Phe Lys Gly Pro Asn  Gly Phe Glu
    2405                2410                2415

Tyr Phe  Ala Pro Ala Asn Thr  His Asn Asn Asn Ile  Glu Gly Gln
    2420                2425                2430

Ala Ile  Leu Tyr Gln Asn Lys  Phe Leu Thr Leu Asn  Gly Lys Lys
    2435                2440                2445
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Tyr Tyr Phe Ala Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Arg Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Ile Gly Ala Asn Gly Tyr Lys Ile Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

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Arg Phe Leu His Leu Leu Gly Asn Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Asn Met Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

<210> 322
<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 322

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Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu

85 90 95

His Phe Val Ala Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
130 135 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145 150 155 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
165 170 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
180 185 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
195 200 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
210 215 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225 230 235 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Ala Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser

290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln

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            500                 505                 510

Gln Ile Asn Ser Leu Ala Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
    530                 535                 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545                 550                 555                 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
        595                 600                 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
    610                 615                 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625                 630                 635                 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
                645                 650                 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
            660                 665                 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
        675                 680                 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
    690                 695                 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
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705 710 715 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
725 730 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
740 745 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
755 760 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
770 775 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785 790 795 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
805 810 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
820 825 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
835 840 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
850 855 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865 870 875 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
885 890 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
900 905 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys

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915 920 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
930 935 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945 950 955 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
965 970 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
980 985 990

Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln Leu
995 1000 1005

Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val Leu
1010 1015 1020

Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu Asp
1025 1030 1035

Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu His
1040 1045 1050

Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val Leu
1055 1060 1065

Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser Ile
1070 1075 1080

Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile Ala
1085 1090 1095

Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile
1100 1105 1110

Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu

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1115 1120 1125

Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys
1130 1135 1140

Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly
1235 1240 1245

Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asn Thr Asn Ile Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr

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1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile
1355 1360 1365

Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp

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1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile

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1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn

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1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asp Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile

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2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ser Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly

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2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
2330 2335 2340

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn

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2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe

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2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

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<211> 2709
<212> PRT
<213> Artificial Sequence

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<223> Synthetic amino acid sequence

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Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Ala Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

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```
Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335
```

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```
Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Gln Ile Asn Ser Leu Ala Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
    530                 535                 540
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```
Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545                 550                 555                 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
        595                 600                 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
    610                 615                 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625                 630                 635                 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
                645                 650                 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
            660                 665                 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
        675                 680                 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
    690                 695                 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705                 710                 715                 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
                725                 730                 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
            740                 745                 750
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```
Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
        755                 760                 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
    770                 775                 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785                 790                 795                 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
                805                 810                 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
            820                 825                 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
        835                 840                 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
    850                 855                 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865                 870                 875                 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
                885                 890                 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
            900                 905                 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
        915                 920                 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
    930                 935                 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945                 950                 955                 960
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```
Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
                965                 970                 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
            980                 985                 990

Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Tyr Asp Ser  Ile Gln Leu
        995                 1000                1005

Val Asn  Leu Ile Ser Asn Ala  Val Asn Asp Thr Ile  Asn Val Leu
    1010                1015                1020

Pro Thr  Ile Thr Glu Gly Ile  Pro Ile Val Ser Thr  Ile Leu Asp
    1025                1030                1035

Gly Ile  Asn Leu Gly Ala Ala  Ile Lys Glu Leu Leu  Asp Glu His
    1040                1045                1050

Asp Pro  Leu Leu Lys Lys Glu  Leu Glu Ala Lys Val  Gly Val Leu
    1055                1060                1065

Ala Ile  Asn Met Ser Leu Ser  Ile Ala Ala Thr Val  Ala Ser Ile
    1070                1075                1080

Val Gly  Ile Gly Ala Glu Val  Thr Ile Phe Leu Leu  Pro Ile Ala
    1085                1090                1095

Gly Ile  Ser Ala Gly Ile Pro  Ser Leu Val Asn Asn  Glu Leu Ile
    1100                1105                1110

Leu His  Asp Lys Ala Thr Ser  Val Val Asn Tyr Phe  Asn His Leu
    1115                1120                1125

Ser Glu  Ser Lys Lys Tyr Gly  Pro Leu Lys Thr Glu  Asp Asp Lys
    1130                1135                1140

Ile Leu  Val Pro Ile Asp Asp  Leu Val Ile Ser Glu  Ile Asp Phe
    1145                1150                1155
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Asn Asn  Asn Ser Ile Lys Leu  Gly Thr Cys Asn Ile  Leu Ala Met
    1160                1165                1170

Glu Gly  Gly Ser Gly His Thr  Val Thr Gly Asn Ile  Asp His Phe
    1175                1180                1185

Phe Ser  Ser Pro Ser Ile Ser  Ser His Ile Pro Ser  Leu Ser Ile
    1190                1195                1200

Tyr Ser  Ala Ile Gly Ile Glu  Thr Glu Asn Leu Asp  Phe Ser Lys
    1205                1210                1215

Lys Ile  Met Met Leu Pro Asn  Ala Pro Ser Arg Val  Phe Trp Trp
    1220                1225                1230

Glu Thr  Gly Ala Val Pro Gly  Leu Arg Ser Leu Glu  Asn Asp Gly
    1235                1240                1245

Thr Arg  Leu Leu Asp Ser Ile  Arg Asp Leu Tyr Pro  Gly Lys Phe
    1250                1255                1260

Tyr Trp  Arg Phe Tyr Ala Phe  Phe Asp Tyr Ala Ile  Thr Thr Leu
    1265                1270                1275

Lys Pro  Val Tyr Glu Asp Thr  Asn Ile Lys Ile Lys  Leu Asp Lys
    1280                1285                1290

Asp Thr  Arg Asn Phe Ile Met  Pro Thr Ile Thr Thr  Asn Glu Ile
    1295                1300                1305

Arg Asn  Lys Leu Ser Tyr Ser  Phe Asp Gly Ala Gly  Gly Thr Tyr
    1310                1315                1320

Ser Leu  Leu Leu Ser Ser Tyr  Pro Ile Ser Thr Asn  Ile Asn Leu
    1325                1330                1335

Ser Lys  Asp Asp Leu Trp Ile  Phe Asn Ile Asp Asn  Glu Val Arg
    1340                1345                1350
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```
Glu Ile  Ser Ile Glu Asn Gly  Thr Ile Lys Lys Gly  Lys Leu Ile
    1355                1360                1365

Lys Asp  Val Leu Ser Lys Ile  Asp Ile Asn Lys Asn  Lys Leu Ile
    1370                1375                1380

Ile Gly  Asn Gln Thr Ile Asp  Phe Ser Gly Asp Ile  Asp Asn Lys
    1385                1390                1395

Asp Arg  Tyr Ile Phe Leu Thr  Cys Glu Leu Asp Asp  Lys Ile Ser
    1400                1405                1410

Leu Ile  Ile Glu Ile Asn Leu  Val Ala Lys Ser Tyr  Ser Leu Leu
    1415                1420                1425

Leu Ser  Gly Asp Lys Asn Tyr  Leu Ile Ser Asn Leu  Ser Asn Thr
    1430                1435                1440

Ile Glu  Lys Ile Asn Thr Leu  Gly Leu Asp Ser Lys  Asn Ile Ala
    1445                1450                1455

Tyr Asn  Tyr Thr Asp Glu Ser  Asn Asn Lys Tyr Phe  Gly Ala Ile
    1460                1465                1470

Ser Lys  Thr Ser Gln Lys Ser  Ile Ile His Tyr Lys  Lys Asp Ser
    1475                1480                1485

Lys Asn  Ile Leu Glu Phe Tyr  Asn Asp Ser Thr Leu  Glu Phe Asn
    1490                1495                1500

Ser Lys  Asp Phe Ile Ala Glu  Asp Ile Asn Val Phe  Met Lys Asp
    1505                1510                1515

Asp Ile  Asn Thr Ile Thr Gly  Lys Tyr Tyr Val Asp  Asn Asn Thr
    1520                1525                1530

Asp Lys  Ser Ile Asp Phe Ser  Ile Ser Leu Val Ser  Lys Asn Gln
    1535                1540                1545
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Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

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Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
1925 1930 1935

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Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Leu Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

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```
Asn Thr  Ala Ile Ala Ser Thr  Gly Tyr Thr Ile Ile  Asn Gly Lys
    2135                2140                2145

His Phe  Tyr Phe Asn Thr Asp  Gly Ile Met Gln Ile  Gly Val Phe
    2150                2155                2160

Lys Gly  Pro Asn Gly Phe Glu  Tyr Phe Ala Pro Ala  Asn Thr Asp
    2165                2170                2175

Ala Asn  Asn Ile Glu Gly Gln  Ala Ile Leu Tyr Gln  Asn Glu Phe
    2180                2185                2190

Leu Thr  Leu Asn Gly Lys Lys  Tyr Tyr Phe Gly Ser  Asp Ser Lys
    2195                2200                2205

Ala Val  Thr Gly Trp Arg Ile  Ile Asn Asn Lys Lys  Tyr Tyr Phe
    2210                2215                2220

Asn Pro  Asn Asn Ala Ile Ala  Ala Ile His Leu Cys  Thr Ile Asn
    2225                2230                2235

Asn Asp  Lys Tyr Tyr Phe Ser  Tyr Asp Gly Ile Leu  Gln Asn Gly
    2240                2245                2250

Tyr Ile  Thr Ile Glu Arg Asn  Asn Phe Tyr Phe Asp  Ala Asn Asn
    2255                2260                2265

Glu Ser  Lys Met Val Thr Gly  Val Phe Lys Gly Pro  Asn Gly Phe
    2270                2275                2280

Glu Tyr  Phe Ala Pro Ala Asn  Thr His Asn Asn Asn  Ile Glu Gly
    2285                2290                2295

Gln Ala  Ile Val Tyr Gln Asn  Lys Phe Leu Thr Leu  Asn Gly Lys
    2300                2305                2310

Lys Tyr  Tyr Phe Asp Asn Asp  Ser Lys Ala Val Thr  Gly Trp Gln
    2315                2320                2325
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Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
2330 2335 2340

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

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Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

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<210> 324
<211> 2365
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Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
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Arg Val Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
            20                  25                  30


Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45


Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60


Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80


Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95


Leu His Phe Val Ala Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110


Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125


Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140


Val Glu Ser Ala Thr Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160


Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Tyr Arg Lys Arg Met Glu
```

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165 170 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Thr Gln
180 185 190

Arg Glu Glu Asn Pro Asp Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
195 200 205

Leu Ser Asn Glu Tyr Ser Lys Asp Ile Asp Glu Leu Asn Ser Tyr Ile
210 215 220

Glu Glu Ser Leu Asn Lys Val Thr Glu Asn Ser Gly Asn Asp Val Arg
225 230 235 240

Asn Phe Glu Glu Phe Lys Gly Gly Glu Ser Phe Lys Leu Tyr Glu Gln
245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
260 265 270

Ile Ser Ala Leu Lys Glu Val Gly Gly Val Tyr Leu Asp Val Ala Met
275 280 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
290 295 300

Ser Val Thr Val Asp Phe Trp Glu Met Val Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln

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370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Ala Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

His Gln Met Ala Ser Leu Ala Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Lys Asn Tyr Phe Glu Gly Ser Leu Gly Glu
530 535 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Thr Val Val Asp Lys Glu Tyr
545 550 555 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
565 570 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala

580 585 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
595 600 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
610 615 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625 630 635 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
645 650 655

Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser Thr
660 665 670

Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
675 680 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Val
690 695 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Arg Val Lys Asp
705 710 715 720

Lys Val Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
725 730 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
740 745 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
755 760 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
770 775 780

Lys Ile Ile Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu

785 790 795 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
805 810 815

Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
820 825 830

Thr Gln Val Val Glu Gly Arg Ile Glu Glu Ala Lys Ser Leu Thr Ser
835 840 845

Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser Ile
850 855 860

Ser Asp Ala Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Glu Glu Ser
865 870 875 880

His Phe Ile Ser Phe Glu Asp Ile Leu Glu Thr Asp Glu Gly Phe Ser
885 890 895

Ile Arg Phe Ile Asp Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
900 905 910

Glu Lys Ala Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
915 920 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
930 935 940

Lys Lys Val Asn Leu Asp Ala Thr His Glu Val Asn Thr Leu Asn Ala
945 950 955 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
965 970 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
980 985 990

Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp Ala Ala Lys Val Val Glu

995 1000 1005

Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu Pro Thr
1010 1015 1020

Leu Ser Glu Gly Leu Pro Val Ile Ala Thr Ile Ile Asp Gly Val
1025 1030 1035

Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp Pro
1040 1045 1050

Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala Val
1055 1060 1065

Asn Leu Thr Ala Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu Gly
1070 1075 1080

Ile Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile
1085 1090 1095

Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile Leu Arg
1100 1105 1110

Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Ser His Ile Ser Leu
1115 1120 1125

Ala Glu Ser Glu Gly Ala Phe Thr Ser Leu Asp Asp Lys Ile Met
1130 1135 1140

Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Thr Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr Asp

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1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Thr Arg Ser Phe Ile Val Pro Val Ile Thr Thr Glu Tyr Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Asn Ile Asn Ile Glu Leu Asn
1325 1330 1335

Glu Asn Asp Thr Trp Val Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Asn Ile Leu Ser Lys Leu Ser Ile Glu Asp Asn Lys Ile Ile Leu
1370 1375 1380

Asp Asn His Glu Ile Asn Phe Ser Gly Thr Leu Asn Gly Gly Asn

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1385 1390 1395

Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Val Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Val Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Thr Leu Met Ala Asn Ser Asn Ser Val Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Leu Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Met Asp Asp Lys Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Cys Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Ser
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asn Ser Lys Pro
1490 1495 1500

Leu Phe Gly Tyr Cys Ser Asn Asp Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asp Val Ile Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Phe Thr Ile Gln Asp Glu Asn Thr
1535 1540 1545

Ile Lys Leu Asn Gly Val Tyr Leu Asp Glu Asn Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Lys Lys Gly Ser Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe

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1580 1585 1590

Ile Asn Ser Leu Gln Ser Asn Thr Lys Leu Ile Leu Asp Thr Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Lys Asp Asn Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Lys Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Ile Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Ile Tyr Glu Ala Asn Asn Thr Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Thr Asn Tyr Ile Ser Glu Lys Ile
1715 1720 1725

Asn Ile Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Ser Asp Phe Ile Leu Met Ser Thr Asp Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Thr Asn Val Phe Lys Gly Asn
1760 1765 1770

Thr Ile Ser Asp Lys Ile Ser Phe Asn Phe Ser Asp Lys Gln Asp

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1775 1780 1785

Val Ser Ile Asn Lys Val Ile Ser Thr Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Val Glu Gly Leu Leu Asn Tyr Asp Leu Gly Leu Ile Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Val Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Ile
1835 1840 1845

Lys Asn Leu Ile Thr Gly Phe Thr Thr Ile Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Asp Asn Gly Gly Ala Ala Ser Val Gly Glu Thr
1865 1870 1875

Ile Ile Asp Gly Lys Asn Tyr Tyr Phe Ser Gln Asn Gly Val Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asp Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Thr Ile Asp Glu Asn Val Tyr Tyr Phe Gly
1925 1930 1935

Asp Asn Tyr Arg Ala Ala Ile Glu Trp Gln Thr Leu Asp Asp Glu
1940 1945 1950

Val Tyr Tyr Phe Ser Thr Asp Thr Gly Arg Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Asp Lys Phe Tyr Phe Asn Ser Asp Gly Ile

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1970 1975 1980

Met Gln Lys Gly Phe Val Asn Ile Asn Asp Lys Thr Phe Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Ser Gly Tyr Thr Glu Ile Asp Gly
2000 2005 2010

Lys Tyr Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Ala Asp Gly Phe Lys Tyr Phe Ala His His Asp Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Ala Leu Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Ile Ser Ile Ile
2090 2095 2100

Asn Asp Gly Lys Tyr Tyr Phe Asn Asp Ser Gly Ile Met Gln Ile
2105 2110 2115

Gly Phe Val Thr Ile Asn Asn Glu Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Val Glu Ser Gly Met Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Glu Asn Gly Leu Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp

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2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asp Pro Glu Thr Lys Lys Ala Tyr Lys Gly Ile Asn Val Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Asn Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Thr Phe Glu Asp Asn His Tyr Tyr Phe Asn Glu Asp Gly
2255 2260 2265

Ile Met Gln Tyr Gly Tyr Leu Asn Ile Glu Asp Lys Thr Phe Tyr
2270 2275 2280

Phe Ser Glu Asp Gly Ile Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu

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2360 2365

<210> 325
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 325

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Ala Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
130 135 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145 150 155 160

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Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365
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Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

His Gln Met Ala Ser Leu Ala Ser Phe Asp Asp Ala Arg Ala Lys Ala
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545                 550                 555                 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575
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Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
            580                 585                 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
        595                 600                 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
    610                 615                 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625                 630                 635                 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
                645                 650                 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
            660                 665                 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
        675                 680                 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
    690                 695                 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705                 710                 715                 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
                725                 730                 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
            740                 745                 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
        755                 760                 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
    770                 775                 780
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Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785                 790                 795                 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
                805                 810                 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
            820                 825                 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
        835                 840                 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
    850                 855                 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865                 870                 875                 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
                885                 890                 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
        915                 920                 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990
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Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005


Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020


Leu Ser  Glu Gly Leu Pro Ile  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035


Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050


Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
    1055                1060                1065


Asn Leu  Thr Thr Ala Thr Thr  Ala Ile Ile Thr Ser  Ser Leu Gly
    1070                1075                1080


Val Ala  Ser Gly Phe Ser Ile  Leu Leu Val Pro Leu  Ala Gly Ile
    1085                1090                1095


Ser Ala  Gly Ile Pro Ser Leu  Val Asn Asn Glu Leu  Val Leu Arg
    1100                1105                1110


Asp Lys  Ala Thr Lys Val Val  Asp Tyr Phe Lys His  Val Ser Leu
    1115                1120                1125


Val Glu  Thr Glu Gly Val Phe  Thr Leu Leu Asp Asp  Lys Ile Met
    1130                1135                1140


Met Pro  Gln Asp Asp Leu Val  Ile Ser Glu Ile Asp  Phe Asn Asn
    1145                1150                1155


Asn Ser  Ile Val Leu Gly Lys  Cys Glu Ile Trp Arg  Met Glu Gly
    1160                1165                1170


Gly Ser  Gly His Thr Val Thr  Asp Asp Ile Asp His  Phe Phe Ser
    1175                1180                1185
```

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Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile Leu
1370 1375 1380

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Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys Thr
1535 1540 1545

Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Arg Lys Gly Asn Thr Asn Thr Ser Asp
1565 1570 1575

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Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe
1580 1585 1590

Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

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Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

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Asn Gln Ile Gly Asp Tyr Lys Tyr Tyr Phe Asn Ser Asp Gly Val
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

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Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

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Ala Gln Leu Val Ile Ser Glu
    2360   2365

<210> 326
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 326

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1   5   10   15

Arg Val Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
            20   25   30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35   40   45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50   55   60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65   70   75   80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85   90   95

Leu His Phe Val Ala Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100   105   110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115   120   125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130   135   140

Val Glu Ser Ala Thr Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu

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145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Tyr Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Thr Gln
            180                 185                 190

Arg Glu Glu Asn Pro Asp Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Asp Ile Asp Glu Leu Asn Ser Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Val Thr Glu Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Gly Gly Glu Ser Phe Lys Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Val Gly Gly Val Tyr Leu Asp Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Val Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
```

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        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Ala Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

His Gln Met Ala Ser Leu Ala Ser Phe Asp Asp Ala Arg Ala Lys Ala
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Lys Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Thr Val Val Asp Lys Glu Tyr
545                 550                 555                 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
```

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565 570 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
580 585 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
595 600 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
610 615 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625 630 635 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
645 650 655

Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser Thr
660 665 670

Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
675 680 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Val
690 695 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Arg Val Lys Asp
705 710 715 720

Lys Val Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
725 730 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
740 745 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
755 760 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn

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770 775 780

Lys Ile Ile Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785 790 795 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
805 810 815

Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
820 825 830

Thr Gln Val Val Glu Gly Arg Ile Glu Glu Ala Lys Ser Leu Thr Ser
835 840 845

Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser Ile
850 855 860

Ser Asp Ala Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Glu Glu Ser
865 870 875 880

His Phe Ile Ser Phe Glu Asp Ile Leu Glu Thr Asp Glu Gly Phe Ser
885 890 895

Ile Arg Phe Ile Asp Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
900 905 910

Glu Lys Ala Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
915 920 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
930 935 940

Lys Lys Val Asn Leu Asp Ala Thr His Glu Val Asn Thr Leu Asn Ala
945 950 955 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
965 970 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu

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980 985 990

Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp Ala Ala Lys Val Val Glu
995 1000 1005

Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu Pro Thr
1010 1015 1020

Leu Ser Glu Gly Leu Pro Val Ile Ala Thr Ile Ile Asp Gly Val
1025 1030 1035

Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp Pro
1040 1045 1050

Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala Val
1055 1060 1065

Asn Leu Thr Ala Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu Gly
1070 1075 1080

Ile Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile
1085 1090 1095

Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile Leu Arg
1100 1105 1110

Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Ser His Ile Ser Leu
1115 1120 1125

Ala Glu Ser Glu Gly Ala Phe Thr Ser Leu Asp Asp Lys Ile Met
1130 1135 1140

Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Thr Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe Ser

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1175 1180 1185

Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Thr Arg Ser Phe Ile Val Pro Val Ile Thr Thr Glu Tyr Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Asn Ile Asn Ile Glu Leu Asn
1325 1330 1335

Glu Asn Asp Thr Trp Val Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Asn Ile Leu Ser Lys Leu Ser Ile Glu Asp Asn Lys Ile Ile Leu

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1370 1375 1380

Asp Asn His Glu Ile Asn Phe Ser Gly Thr Leu Asn Gly Gly Asn
1385 1390 1395

Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Val Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Val Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Thr Leu Met Ala Asn Ser Asn Ser Val Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Leu Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Met Asp Asp Lys Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Cys Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Ser
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asn Ser Lys Pro
1490 1495 1500

Leu Phe Gly Tyr Cys Ser Asn Asp Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asp Val Ile Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Phe Thr Ile Gln Asp Glu Asn Thr
1535 1540 1545

Ile Lys Leu Asn Gly Val Tyr Leu Asp Glu Asn Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Lys Lys Gly Ser Thr Asn Thr Ser Asp

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1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe
1580 1585 1590

Ile Asn Ser Leu Gln Ser Asn Thr Lys Leu Ile Leu Asp Thr Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Lys Asp Asn Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Lys Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Ile Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Ile Tyr Glu Ala Asn Asn Thr Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Thr Asn Tyr Ile Ser Glu Lys Ile
1715 1720 1725

Asn Ile Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Ser Asp Phe Ile Leu Met Ser Thr Asp Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Thr Asn Val Phe Lys Gly Asn

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1760 1765 1770

Thr Ile Ser Asp Lys Ile Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Ser Ile Asn Lys Val Ile Ser Thr Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Val Glu Gly Leu Leu Asn Tyr Asp Leu Gly Leu Ile Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Val Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Ile
1835 1840 1845

Lys Asn Leu Ile Thr Gly Phe Thr Thr Ile Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Asp Asn Gly Gly Ala Ala Ser Val Gly Glu Thr
1865 1870 1875

Ile Ile Asp Gly Lys Asn Tyr Tyr Phe Ser Gln Asn Gly Val Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asp Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Thr Ile Asp Glu Asn Val Tyr Tyr Phe Gly
1925 1930 1935

Asp Asn Tyr Arg Ala Ala Ile Glu Trp Gln Thr Leu Asp Asp Glu
1940 1945 1950

Val Tyr Tyr Phe Ser Thr Asp Thr Gly Arg Ala Phe Lys Gly Leu

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1955 1960 1965

Asn Gln Ile Gly Asp Asp Lys Phe Tyr Phe Asn Ser Asp Gly Ile
1970 1975 1980

Met Gln Lys Gly Phe Val Asn Ile Asn Asp Lys Thr Phe Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Ser Gly Tyr Thr Glu Ile Asp Gly
2000 2005 2010

Lys Tyr Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Ala Asp Gly Phe Lys Tyr Phe Ala His His Asp Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Ala Leu Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Ile Ser Ile Ile
2090 2095 2100

Asn Asp Gly Lys Tyr Tyr Phe Asn Asp Ser Gly Ile Met Gln Ile
2105 2110 2115

Gly Phe Val Thr Ile Asn Asn Glu Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Val Glu Ser Gly Met Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Glu Asn Gly Leu Val Gln Ile Gly Val Phe Asp Thr

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2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asp Pro Glu Thr Lys Lys Ala Tyr Lys Gly Ile Asn Val Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Asn Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Thr Phe Glu Asp Asn His Tyr Tyr Phe Asn Glu Asp Gly
2255 2260 2265

Ile Met Gln Tyr Gly Tyr Leu Asn Ile Glu Asp Lys Thr Phe Tyr
2270 2275 2280

Phe Ser Glu Asp Gly Ile Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr

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2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 327
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 327

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Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Ala Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
130 135 140

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```
Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350
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Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

His Gln Met Ala Ser Leu Ala Ser Phe Asp Asp Ala Arg Ala Lys Ala
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545                 550                 555                 560
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Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
565 570 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
580 585 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
595 600 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
610 615 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625 630 635 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
645 650 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
660 665 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
675 680 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
690 695 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705 710 715 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
725 730 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
740 745 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
755 760 765

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Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
770 775 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785 790 795 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
805 810 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
820 825 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
835 840 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
850 855 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865 870 875 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
885 890 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
900 905 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
915 920 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
930 935 940

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945 950 955 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
965 970 975

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```
Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Ile  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050

Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
    1055                1060                1065

Asn Leu  Thr Thr Ala Thr Thr  Ala Ile Ile Thr Ser  Ser Leu Gly
    1070                1075                1080

Val Ala  Ser Gly Phe Ser Ile  Leu Leu Val Pro Leu  Ala Gly Ile
    1085                1090                1095

Ser Ala  Gly Ile Pro Ser Leu  Val Asn Asn Glu Leu  Val Leu Arg
    1100                1105                1110

Asp Lys  Ala Thr Lys Val Val  Asp Tyr Phe Lys His  Val Ser Leu
    1115                1120                1125

Val Glu  Thr Glu Gly Val Phe  Thr Leu Leu Asp Asp  Lys Ile Met
    1130                1135                1140

Met Pro  Gln Asp Asp Leu Val  Ile Ser Glu Ile Asp  Phe Asn Asn
    1145                1150                1155

Asn Ser  Ile Val Leu Gly Lys  Cys Glu Ile Trp Arg  Met Glu Gly
    1160                1165                1170
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Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

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Gly Ile  Leu Ser Thr Leu Ser  Ile Glu Glu Asn Lys  Ile Ile Leu
    1370                1375                1380

Asn Ser  His Glu Ile Asn Phe  Ser Gly Glu Val Asn  Gly Ser Asn
    1385                1390                1395

Gly Phe  Val Ser Leu Thr Phe  Ser Ile Leu Glu Gly  Ile Asn Ala
    1400                1405                1410

Ile Ile  Glu Val Asp Leu Leu  Ser Lys Ser Tyr Lys  Leu Leu Ile
    1415                1420                1425

Ser Gly  Glu Leu Lys Ile Leu  Met Leu Asn Ser Asn  His Ile Gln
    1430                1435                1440

Gln Lys  Ile Asp Tyr Ile Gly  Phe Asn Ser Glu Leu  Gln Lys Asn
    1445                1450                1455

Ile Pro  Tyr Ser Phe Val Asp  Ser Glu Gly Lys Glu  Asn Gly Phe
    1460                1465                1470

Ile Asn  Gly Ser Thr Lys Glu  Gly Leu Phe Val Ser  Glu Leu Pro
    1475                1480                1485

Asp Val  Val Leu Ile Ser Lys  Val Tyr Met Asp Asp  Ser Lys Pro
    1490                1495                1500

Ser Phe  Gly Tyr Tyr Ser Asn  Asn Leu Lys Asp Val  Lys Val Ile
    1505                1510                1515

Thr Lys  Asp Asn Val Asn Ile  Leu Thr Gly Tyr Tyr  Leu Lys Asp
    1520                1525                1530

Asp Ile  Lys Ile Ser Leu Ser  Leu Thr Leu Gln Asp  Glu Lys Thr
    1535                1540                1545

Ile Lys  Leu Asn Ser Val His  Leu Asp Glu Ser Gly  Val Ala Glu
    1550                1555                1560
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Ile Leu Lys Phe Met Asn Arg Lys Gly Asn Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe
1580 1585 1590

Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

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Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

```
Met His  Tyr Phe Ser Pro Glu  Thr Gly Lys Ala Phe  Lys Gly Leu
    1955                1960                1965

Asn Gln  Ile Gly Asp Tyr Lys  Tyr Tyr Phe Asn Ser  Asp Gly Val
    1970                1975                1980

Met Gln  Lys Gly Phe Val Ser  Ile Asn Asp Asn Lys  His Tyr Phe
    1985                1990                1995

Asp Asp  Ser Gly Val Met Lys  Val Gly Tyr Thr Glu  Ile Asp Gly
    2000                2005                2010

Lys His  Phe Tyr Phe Ala Glu  Asn Gly Glu Met Gln  Ile Gly Val
    2015                2020                2025

Phe Asn  Thr Glu Asp Gly Phe  Lys Tyr Phe Ala His  His Asn Glu
    2030                2035                2040

Asp Leu  Gly Asn Glu Glu Gly  Glu Glu Ile Ser Tyr  Ser Gly Ile
    2045                2050                2055

Leu Asn  Phe Asn Asn Lys Ile  Tyr Tyr Phe Asp Asp  Ser Phe Thr
    2060                2065                2070

Ala Val  Val Gly Trp Lys Asp  Leu Glu Asp Gly Ser  Lys Tyr Tyr
    2075                2080                2085

Phe Asp  Glu Asp Thr Ala Glu  Ala Tyr Ile Gly Leu  Ser Leu Ile
    2090                2095                2100

Asn Asp  Gly Gln Tyr Tyr Phe  Asn Asp Asp Gly Ile  Met Gln Val
    2105                2110                2115

Gly Phe  Val Thr Ile Asn Asp  Lys Val Phe Tyr Phe  Ser Asp Ser
    2120                2125                2130

Gly Ile  Ile Glu Ser Gly Val  Gln Asn Ile Asp Asp  Asn Tyr Phe
    2135                2140                2145
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Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

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Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

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<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 328

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Ala Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val

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130 135 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145 150 155 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
165 170 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
180 185 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
195 200 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
210 215 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225 230 235 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
260 265 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Ala Met
275 280 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
290 295 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys

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            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

His Gln Met Ala Ser Leu Ala Ser Phe Asp Asp Ala Arg Ala Lys Ala
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
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545                 550                 555                 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
            580                 585                 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
        595                 600                 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
    610                 615                 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625                 630                 635                 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
                645                 650                 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
            660                 665                 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
        675                 680                 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
    690                 695                 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705                 710                 715                 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
                725                 730                 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
            740                 745                 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
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        755                 760                 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
    770                 775                 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785                 790                 795                 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
                805                 810                 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
            820                 825                 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
        835                 840                 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
    850                 855                 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865                 870                 875                 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
                885                 890                 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
        915                 920                 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
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                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Ile  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050

Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
    1055                1060                1065

Asn Leu  Thr Thr Ala Thr Thr  Ala Ile Ile Thr Ser  Ser Leu Gly
    1070                1075                1080

Ile Ala  Ser Gly Phe Ser Ile  Leu Leu Val Pro Leu  Ala Gly Ile
    1085                1090                1095

Ser Ala  Gly Ile Pro Ser Leu  Val Asn Asn Glu Leu  Val Leu Arg
    1100                1105                1110

Asp Lys  Ala Thr Lys Val Val  Asp Tyr Phe Lys His  Val Ser Leu
    1115                1120                1125

Val Glu  Thr Glu Gly Val Phe  Thr Leu Leu Asp Asp  Lys Ile Met
    1130                1135                1140

Met Pro  Gln Asp Asp Leu Val  Ile Ser Glu Ile Asp  Phe Asn Asn
    1145                1150                1155

Asn Ser  Ile Val Leu Gly Lys  Cys Glu Ile Trp Arg  Met Glu Gly
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1160 1165 1170

Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu

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1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile Leu
1370 1375 1380

Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Arg Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys Thr
1535 1540 1545

Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala Glu

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1550 1555 1560

Ile Leu Lys Phe Met Asn Arg Lys Gly Asn Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe
1580 1585 1590

Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys

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1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu

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1940 1945 1950

Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Val
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe

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2135 2140 2145

Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly

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2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 329
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 329

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Ala Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

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Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335
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Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

His Gln Met Ala Ser Leu Ala Ser Phe Asp Asp Ala Arg Ala Lys Ala
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540
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Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545                 550                 555                 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
            580                 585                 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
        595                 600                 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
    610                 615                 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625                 630                 635                 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
                645                 650                 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
            660                 665                 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
        675                 680                 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
    690                 695                 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705                 710                 715                 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
                725                 730                 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
            740                 745                 750
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```
Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
        755                 760                 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
    770                 775                 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785                 790                 795                 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
                805                 810                 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
            820                 825                 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
        835                 840                 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
    850                 855                 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865                 870                 875                 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
                885                 890                 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
        915                 920                 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960
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Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
965 970 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
980 985 990

Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp Ala Ala Lys Val Val Glu
995 1000 1005

Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu Pro Thr
1010 1015 1020

Leu Ser Glu Gly Leu Pro Ile Ile Ala Thr Ile Ile Asp Gly Val
1025 1030 1035

Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp Pro
1040 1045 1050

Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala Val
1055 1060 1065

Asn Leu Thr Thr Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu Gly
1070 1075 1080

Ile Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile
1085 1090 1095

Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg
1100 1105 1110

Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Val Ser Leu
1115 1120 1125

Val Glu Thr Glu Gly Val Phe Thr Leu Leu Asp Asp Lys Ile Met
1130 1135 1140

Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

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```
Asn Ser  Ile Val Leu Gly Lys  Cys Glu Ile Trp Arg  Met Glu Gly
    1160                 1165                 1170

Gly Ser  Gly His Thr Val Thr  Asp Asp Ile Asp His  Phe Phe Ser
    1175                 1180                 1185

Ala Pro  Ser Ile Thr Tyr Arg  Glu Pro His Leu Ser  Ile Tyr Asp
    1190                 1195                 1200

Val Leu  Glu Val Gln Lys Glu  Glu Leu Asp Leu Ser  Lys Asp Leu
    1205                 1210                 1215

Met Val  Leu Pro Asn Ala Pro  Asn Arg Val Phe Ala  Trp Glu Thr
    1220                 1225                 1230

Gly Trp  Thr Pro Gly Leu Arg  Ser Leu Glu Asn Asp  Gly Thr Lys
    1235                 1240                 1245

Leu Leu  Asp Arg Ile Arg Asp  Asn Tyr Glu Gly Glu  Phe Tyr Trp
    1250                 1255                 1260

Arg Tyr  Phe Ala Phe Ile Ala  Asp Ala Leu Ile Thr  Thr Leu Lys
    1265                 1270                 1275

Pro Arg  Tyr Glu Asp Thr Asn  Ile Arg Ile Asn Leu  Asp Ser Asn
    1280                 1285                 1290

Thr Arg  Ser Phe Ile Val Pro  Ile Ile Thr Thr Glu  Tyr Ile Arg
    1295                 1300                 1305

Glu Lys  Leu Ser Tyr Ser Phe  Tyr Gly Ser Gly Gly  Thr Tyr Ala
    1310                 1315                 1320

Leu Ser  Leu Ser Gln Tyr Asn  Met Gly Ile Asn Ile  Glu Leu Ser
    1325                 1330                 1335

Glu Ser  Asp Val Trp Ile Ile  Asp Val Asp Asn Val  Val Arg Asp
    1340                 1345                 1350
```

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```
Val Thr  Ile Glu Ser Asp Lys  Ile Lys Lys Gly Asp  Leu Ile Glu
    1355                1360                1365

Gly Ile  Leu Ser Thr Leu Ser  Ile Glu Glu Asn Lys  Ile Ile Leu
    1370                1375                1380

Asn Ser  His Glu Ile Asn Phe  Ser Gly Glu Val Asn  Gly Ser Asn
    1385                1390                1395

Gly Phe  Val Ser Leu Thr Phe  Ser Ile Leu Glu Gly  Ile Asn Ala
    1400                1405                1410

Ile Ile  Glu Val Asp Leu Leu  Ser Lys Ser Tyr Lys  Leu Leu Ile
    1415                1420                1425

Ser Gly  Glu Leu Lys Ile Leu  Met Leu Asn Ser Asn  His Ile Gln
    1430                1435                1440

Gln Lys  Ile Asp Tyr Ile Gly  Phe Asn Ser Glu Leu  Gln Lys Asn
    1445                1450                1455

Ile Pro  Tyr Ser Phe Val Asp  Ser Glu Gly Lys Glu  Asn Gly Phe
    1460                1465                1470

Ile Asn  Gly Ser Thr Lys Glu  Gly Leu Phe Val Ser  Glu Leu Pro
    1475                1480                1485

Asp Val  Val Leu Ile Ser Lys  Val Tyr Met Asp Asp  Ser Lys Pro
    1490                1495                1500

Ser Phe  Gly Tyr Tyr Ser Asn  Asn Leu Lys Asp Val  Lys Val Ile
    1505                1510                1515

Thr Lys  Asp Asn Val Asn Ile  Leu Thr Gly Tyr Tyr  Leu Lys Asp
    1520                1525                1530

Asp Ile  Lys Ile Ser Leu Ser  Leu Thr Leu Gln Asp  Glu Lys Thr
    1535                1540                1545
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```
Ile Lys  Leu Asn Ser Val His  Leu Asp Glu Ser Gly  Val Ala Glu
    1550                1555                1560

Ile Leu  Lys Phe Met Asn Arg  Lys Gly Asn Thr Asn  Thr Ser Asp
    1565                1570                1575

Ser Leu  Met Ser Phe Leu Glu  Ser Met Asn Ile Lys  Ser Ile Phe
    1580                1585                1590

Val Asn  Phe Leu Gln Ser Asn  Ile Lys Phe Ile Leu  Asp Ala Asn
    1595                1600                1605

Phe Ile  Ile Ser Gly Thr Thr  Ser Ile Gly Gln Phe  Glu Phe Ile
    1610                1615                1620

Cys Asp  Glu Asn Asp Asn Ile  Gln Pro Tyr Phe Ile  Lys Phe Asn
    1625                1630                1635

Thr Leu  Glu Thr Asn Tyr Thr  Leu Tyr Val Gly Asn  Arg Gln Asn
    1640                1645                1650

Met Ile  Val Glu Pro Asn Tyr  Asp Leu Asp Asp Ser  Gly Asp Ile
    1655                1660                1665

Ser Ser  Thr Val Ile Asn Phe  Ser Gln Lys Tyr Leu  Tyr Gly Ile
    1670                1675                1680

Asp Ser  Cys Val Asn Lys Val  Val Ile Ser Pro Asn  Ile Tyr Thr
    1685                1690                1695

Asp Glu  Ile Asn Ile Thr Pro  Val Tyr Glu Thr Asn  Asn Thr Tyr
    1700                1705                1710

Pro Glu  Val Ile Val Leu Asp  Ala Asn Tyr Ile Asn  Glu Lys Ile
    1715                1720                1725

Asn Val  Asn Ile Asn Asp Leu  Ser Ile Arg Tyr Val  Trp Ser Asn
    1730                1735                1740
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```
Asp Gly  Asn Asp Phe Ile Leu  Met Ser Thr Ser Glu  Glu Asn Lys
    1745                1750                1755

Val Ser  Gln Val Lys Ile Arg  Phe Val Asn Val Phe  Lys Asp Lys
    1760                1765                1770

Thr Leu  Ala Asn Lys Leu Ser  Phe Asn Phe Ser Asp  Lys Gln Asp
    1775                1780                1785

Val Pro  Val Ser Glu Ile Ile  Leu Ser Phe Thr Pro  Ser Tyr Tyr
    1790                1795                1800

Glu Asp  Gly Leu Ile Gly Tyr  Asp Leu Gly Leu Val  Ser Leu Tyr
    1805                1810                1815

Asn Glu  Lys Phe Tyr Ile Asn  Asn Phe Gly Met Met  Val Ser Gly
    1820                1825                1830

Leu Ile  Tyr Ile Asn Asp Ser  Leu Tyr Tyr Phe Lys  Pro Pro Val
    1835                1840                1845

Asn Asn  Leu Ile Thr Gly Phe  Val Thr Val Gly Asp  Asp Lys Tyr
    1850                1855                1860

Tyr Phe  Asn Pro Ile Asn Gly  Gly Ala Ala Ser Ile  Gly Glu Thr
    1865                1870                1875

Ile Ile  Asp Asp Lys Asn Tyr  Tyr Phe Asn Gln Ser  Gly Val Leu
    1880                1885                1890

Gln Thr  Gly Val Phe Ser Thr  Glu Asp Gly Phe Lys  Tyr Phe Ala
    1895                1900                1905

Pro Ala  Asn Thr Leu Asp Glu  Asn Leu Glu Gly Glu  Ala Ile Asp
    1910                1915                1920

Phe Thr  Gly Lys Leu Ile Ile  Asp Glu Asn Ile Tyr  Tyr Phe Asp
    1925                1930                1935
```

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Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Val
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

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Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

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Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 330
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 330

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Ala Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val

115 120 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
130 135 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145 150 155 160

Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
165 170 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
180 185 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
195 200 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
210 215 220

Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val Arg
225 230 235 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu Gln
245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
260 265 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Ala Met
275 280 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
290 295 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met

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325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Gln Met Ala Ser Leu Ala Thr Phe Asp Asp Ala Arg Ala Lys Val
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu

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530 535 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545 550 555 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
565 570 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
580 585 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Ile Leu Phe Gln
595 600 605

Lys Asn Ile Glu Asn Ser Glu Val Ala Tyr Tyr Tyr Asn Pro Gly Asp
610 615 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Arg Ile Pro Ser Ile Ile Ser
625 630 635 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
645 650 655

Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser Thr
660 665 670

Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Ser Lys
675 680 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
690 695 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705 710 715 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
725 730 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Asn Glu Gly Arg Arg Glu

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740 745 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
755 760 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
770 775 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785 790 795 800

Gln Glu Ile Arg Asn Asn Ser Asn Leu Ser Asp Ile Glu Leu Glu Glu
805 810 815

Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
820 825 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
835 840 845

Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser Ile
850 855 860

Ser Asp Ser Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Asp Asp Ser
865 870 875 880

His Phe Ile Ser Phe Glu Asp Ile Ser Lys Thr Glu Asp Gly Phe Ser
885 890 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
900 905 910

Glu Lys Glu Ile Phe Ser Glu Tyr Ala Asn His Ile Glu Arg Glu Ile
915 920 925

Ser Asn Ile Lys Asp Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
930 935 940

Lys Lys Val Asn Leu Asp Ala Ile His Glu Val Asn Thr Leu Asn Ala

945 950 955 960

Ala Phe Phe Ile Gln Ser Leu Ile Gly Tyr Ser Ser Ser Lys Glu Ser
965 970 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
980 985 990

Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp Ala Ala Lys Val Val Glu
995 1000 1005

Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu Pro Thr
1010 1015 1020

Leu Ser Glu Gly Leu Pro Val Ile Ala Thr Ile Ile Asp Gly Val
1025 1030 1035

Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp Pro
1040 1045 1050

Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala Val
1055 1060 1065

Asn Leu Thr Ala Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu Gly
1070 1075 1080

Ile Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile
1085 1090 1095

Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg
1100 1105 1110

Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Ile Ser Leu
1115 1120 1125

Val Glu Thr Glu Gly Ala Phe Thr Leu Leu Asp Asp Lys Ile Met
1130 1135 1140

Ile Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn

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1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asn Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ser Pro Thr Ile Thr Tyr Ile Lys Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Glu Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp His Tyr Lys Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Asn Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu His Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe His Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp

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1340 1345 1350

Val Thr Ile Asp Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Asp Asn Lys Ile Ile Leu
1370 1375 1380

Asn His His Glu Ile Asn Phe Ser Gly Asp Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Ile Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Phe Thr Leu Gln Asp Glu Lys Thr

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1535 1540 1545

Ile Lys Leu Asn Gly Val His Leu Asp Glu Ser Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Lys Lys Gly Ser Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Val Asn Ile Lys Ser Ile Phe
1580 1585 1590

Val Asn Phe Leu Gln Ser Lys Ile Asn Phe Ile Leu Asp Ala Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Thr Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Asn Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn

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1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Ser Ala Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Thr Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asn Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Ile Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Leu Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Glu

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1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met Tyr Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Ile
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Lys Lys Tyr Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Ile Glu Ile Asp Gly
2000 2005 2010

Lys Tyr Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Ser Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Ala Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Tyr Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Val Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asn Lys Val Phe Tyr Phe Ser Asp Ser

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2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Glu Lys Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Glu Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Asp Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Ile Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Asn Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asp Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Gln
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp

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2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

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<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 331

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Ala Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

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```
Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320
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```
Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Gln Met Ala Ser Leu Ala Ser Phe Asp Asp Ala Arg Ala Lys Ala
        515                 520                 525
```

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```
Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545                 550                 555                 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
            580                 585                 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
        595                 600                 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
    610                 615                 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625                 630                 635                 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
                645                 650                 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
            660                 665                 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
        675                 680                 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
    690                 695                 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705                 710                 715                 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
                725                 730                 735
```

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```
Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
            740                 745                 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
        755                 760                 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
    770                 775                 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785                 790                 795                 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
                805                 810                 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
            820                 825                 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
        835                 840                 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
    850                 855                 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865                 870                 875                 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
                885                 890                 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
        915                 920                 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940
```

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```
Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Ile  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050

Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
    1055                1060                1065

Asn Leu  Thr Thr Ala Thr Thr  Ala Ile Ile Thr Ser  Ser Leu Gly
    1070                1075                1080

Ile Ala  Ser Gly Phe Ser Ile  Leu Leu Val Pro Leu  Ala Gly Ile
    1085                1090                1095

Ser Ala  Gly Ile Pro Ser Leu  Val Asn Asn Glu Leu  Val Leu Arg
    1100                1105                1110

Asp Lys  Ala Thr Lys Val Val  Asp Tyr Phe Lys His  Val Ser Leu
    1115                1120                1125

Val Glu  Thr Glu Gly Val Phe  Thr Leu Leu Asp Asp  Lys Ile Met
    1130                1135                1140
```

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```
Met Pro  Gln Asp Asp Leu Val  Ile Ser Glu Ile Asp  Phe Asn Asn
    1145                1150                1155

Asn Ser  Ile Val Leu Gly Lys  Cys Glu Ile Trp Arg  Met Glu Gly
    1160                1165                1170

Gly Ser  Gly His Thr Val Thr  Asp Asp Ile Asp His  Phe Phe Ser
    1175                1180                1185

Ala Pro  Ser Ile Thr Tyr Arg  Glu Pro His Leu Ser  Ile Tyr Asp
    1190                1195                1200

Val Leu  Glu Val Gln Lys Glu  Glu Leu Asp Leu Ser  Lys Asp Leu
    1205                1210                1215

Met Val  Leu Pro Asn Ala Pro  Asn Arg Val Phe Ala  Trp Glu Thr
    1220                1225                1230

Gly Trp  Thr Pro Gly Leu Arg  Ser Leu Glu Asn Asp  Gly Thr Lys
    1235                1240                1245

Leu Leu  Asp Arg Ile Arg Asp  Asn Tyr Glu Gly Glu  Phe Tyr Trp
    1250                1255                1260

Arg Tyr  Phe Ala Phe Ile Ala  Asp Ala Leu Ile Thr  Thr Leu Lys
    1265                1270                1275

Pro Arg  Tyr Glu Asp Thr Asn  Ile Arg Ile Asn Leu  Asp Ser Asn
    1280                1285                1290

Thr Arg  Ser Phe Ile Val Pro  Ile Ile Thr Thr Glu  Tyr Ile Arg
    1295                1300                1305

Glu Lys  Leu Ser Tyr Ser Phe  Tyr Gly Ser Gly Gly  Thr Tyr Ala
    1310                1315                1320

Leu Ser  Leu Ser Gln Tyr Asn  Met Gly Ile Asn Ile  Glu Leu Ser
    1325                1330                1335
```

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Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile Leu
1370 1375 1380

Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

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```
Asp Ile  Lys Ile Ser Leu Ser  Leu Thr Leu Gln Asp  Glu Lys Thr
    1535                1540                1545

Ile Lys  Leu Asn Ser Val His  Leu Asp Glu Ser Gly  Val Ala Glu
    1550                1555                1560

Ile Leu  Lys Phe Met Asn Arg  Lys Gly Asn Thr Asn  Thr Ser Asp
    1565                1570                1575

Ser Leu  Met Ser Phe Leu Glu  Ser Met Asn Ile Lys  Ser Ile Phe
    1580                1585                1590

Val Asn  Phe Leu Gln Ser Asn  Ile Lys Phe Ile Leu  Asp Ala Asn
    1595                1600                1605

Phe Ile  Ile Ser Gly Thr Thr  Ser Ile Gly Gln Phe  Glu Phe Ile
    1610                1615                1620

Cys Asp  Glu Asn Asp Asn Ile  Gln Pro Tyr Phe Ile  Lys Phe Asn
    1625                1630                1635

Thr Leu  Glu Thr Asn Tyr Thr  Leu Tyr Val Gly Asn  Arg Gln Asn
    1640                1645                1650

Met Ile  Val Glu Pro Asn Tyr  Asp Leu Asp Asp Ser  Gly Asp Ile
    1655                1660                1665

Ser Ser  Thr Val Ile Asn Phe  Ser Gln Lys Tyr Leu  Tyr Gly Ile
    1670                1675                1680

Asp Ser  Cys Val Asn Lys Val  Val Ile Ser Pro Asn  Ile Tyr Thr
    1685                1690                1695

Asp Glu  Ile Asn Ile Thr Pro  Val Tyr Glu Thr Asn  Asn Thr Tyr
    1700                1705                1710

Pro Glu  Val Ile Val Leu Asp  Ala Asn Tyr Ile Asn  Glu Lys Ile
    1715                1720                1725
```

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```
Asn Val  Asn Ile Asn Asp Leu  Ser Ile Arg Tyr Val  Trp Ser Asn
    1730                1735                1740

Asp Gly  Asn Asp Phe Ile Leu  Met Ser Thr Ser Glu  Glu Asn Lys
    1745                1750                1755

Val Ser  Gln Val Lys Ile Arg  Phe Val Asn Val Phe  Lys Asp Lys
    1760                1765                1770

Thr Leu  Ala Asn Lys Leu Ser  Phe Asn Phe Ser Asp  Lys Gln Asp
    1775                1780                1785

Val Pro  Val Ser Glu Ile Ile  Leu Ser Phe Thr Pro  Ser Tyr Tyr
    1790                1795                1800

Glu Asp  Gly Leu Ile Gly Tyr  Asp Leu Gly Leu Val  Ser Leu Tyr
    1805                1810                1815

Asn Glu  Lys Phe Tyr Ile Asn  Asn Phe Gly Met Met  Val Ser Gly
    1820                1825                1830

Leu Ile  Tyr Ile Asn Asp Ser  Leu Tyr Tyr Phe Lys  Pro Pro Val
    1835                1840                1845

Asn Asn  Leu Ile Thr Gly Phe  Val Thr Val Gly Asp  Asp Lys Tyr
    1850                1855                1860

Tyr Phe  Asn Pro Ile Asn Gly  Gly Ala Ala Ser Ile  Gly Glu Thr
    1865                1870                1875

Ile Ile  Asp Asp Lys Asn Tyr  Tyr Phe Asn Gln Ser  Gly Val Leu
    1880                1885                1890

Gln Thr  Gly Val Phe Ser Thr  Glu Asp Gly Phe Lys  Tyr Phe Ala
    1895                1900                1905

Pro Ala  Asn Thr Leu Asp Glu  Asn Leu Glu Gly Glu  Ala Ile Asp
    1910                1915                1920
```

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```
Phe Thr  Gly Lys Leu Ile Ile  Asp Glu Asn Ile Tyr  Tyr Phe Asp
    1925                1930                1935

Asp Asn  Tyr Arg Gly Ala Val  Glu Trp Lys Glu Leu  Asp Gly Glu
    1940                1945                1950

Met His  Tyr Phe Ser Pro Glu  Thr Gly Lys Ala Phe  Lys Gly Leu
    1955                1960                1965

Asn Gln  Ile Gly Asp Asp Lys  Tyr Tyr Phe Asn Ser  Asp Gly Val
    1970                1975                1980

Met Gln  Lys Gly Phe Val Ser  Ile Asn Asp Asn Lys  His Tyr Phe
    1985                1990                1995

Asp Asp  Ser Gly Val Met Lys  Val Gly Tyr Thr Glu  Ile Asp Gly
    2000                2005                2010

Lys His  Phe Tyr Phe Ala Glu  Asn Gly Glu Met Gln  Ile Gly Val
    2015                2020                2025

Phe Asn  Thr Glu Asp Gly Phe  Lys Tyr Phe Ala His  His Asn Glu
    2030                2035                2040

Asp Leu  Gly Asn Glu Glu Gly  Glu Glu Ile Ser Tyr  Ser Gly Ile
    2045                2050                2055

Leu Asn  Phe Asn Asn Lys Ile  Tyr Tyr Phe Asp Asp  Ser Phe Thr
    2060                2065                2070

Ala Val  Val Gly Trp Lys Asp  Leu Glu Asp Gly Ser  Lys Tyr Tyr
    2075                2080                2085

Phe Asp  Glu Asp Thr Ala Glu  Ala Tyr Ile Gly Leu  Ser Leu Ile
    2090                2095                2100

Asn Asp  Gly Gln Tyr Tyr Phe  Asn Asp Asp Gly Ile  Met Gln Val
    2105                2110                2115
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Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

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Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 332
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 332

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Ala Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn

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            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
```

305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Gln Met Ala Ser Leu Ala Thr Phe Asp Asp Ala Arg Ala Lys Val

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515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
530 535 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545 550 555 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
565 570 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
580 585 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Ile Leu Phe Gln
595 600 605

Lys Asn Ile Glu Asn Ser Glu Val Ala Tyr Tyr Tyr Asn Pro Gly Asp
610 615 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Arg Ile Pro Ser Ile Ile Ser
625 630 635 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
645 650 655

Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser Thr
660 665 670

Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Ser Lys
675 680 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
690 695 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705 710 715 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val

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725 730 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Asn Glu Gly Arg Arg Glu
740 745 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
755 760 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
770 775 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785 790 795 800

Gln Glu Ile Arg Asn Asn Ser Asn Leu Ser Asp Ile Glu Leu Glu Glu
805 810 815

Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
820 825 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
835 840 845

Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser Ile
850 855 860

Ser Asp Ser Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Asp Asp Ser
865 870 875 880

His Phe Ile Ser Phe Glu Asp Ile Ser Lys Thr Glu Asp Gly Phe Ser
885 890 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
900 905 910

Glu Lys Glu Ile Phe Ser Glu Tyr Ala Asn His Ile Glu Arg Glu Ile
915 920 925

Ser Asn Ile Lys Asp Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val

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    930                 935                 940

Lys Lys Val Asn Leu Asp Ala Ile His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Gly Tyr Ser Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Val  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050

Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
    1055                1060                1065

Asn Leu  Thr Ala Ala Thr Thr  Ala Ile Ile Thr Ser  Ser Leu Gly
    1070                1075                1080

Ile Ala  Ser Gly Phe Ser Ile  Leu Leu Val Pro Leu  Ala Gly Ile
    1085                1090                1095

Ser Ala  Gly Ile Pro Ser Leu  Val Asn Asn Glu Leu  Val Leu Arg
    1100                1105                1110

Asp Lys  Ala Thr Lys Val Val  Asp Tyr Phe Lys His  Ile Ser Leu
    1115                1120                1125

Val Glu  Thr Glu Gly Ala Phe  Thr Leu Leu Asp Asp  Lys Ile Met
```

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1130 1135 1140

Ile Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asn Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ser Pro Thr Ile Thr Tyr Ile Lys Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Glu Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp His Tyr Lys Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Asn Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu His Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe His Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser

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1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Asp Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Asp Asn Lys Ile Ile Leu
1370 1375 1380

Asn His His Glu Ile Asn Phe Ser Gly Asp Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Ile Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp

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1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Phe Thr Leu Gln Asp Glu Lys Thr
1535 1540 1545

Ile Lys Leu Asn Gly Val His Leu Asp Glu Ser Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Lys Lys Gly Ser Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Val Asn Ile Lys Ser Ile Phe
1580 1585 1590

Val Asn Phe Leu Gln Ser Lys Ile Asn Phe Ile Leu Asp Ala Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Thr Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Asn Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile

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1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Ser Ala Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Thr Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asn Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Ile Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Leu Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp

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1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Glu
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met Tyr Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Ile
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Lys Lys Tyr Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Ile Glu Ile Asp Gly
2000 2005 2010

Lys Tyr Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Ser Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Ala Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Tyr Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Val Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val

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2105 2110 2115

Gly Phe Val Thr Ile Asn Asn Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Glu Lys Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Glu Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Asp Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Ile Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Asn Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asp Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Gln
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn

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2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 333
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 333

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Val Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

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```
Leu His Phe Val Ala Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Val Glu Ser Ala Thr Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Tyr Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Thr Gln
            180                 185                 190

Arg Glu Glu Asn Pro Asp Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Asp Ile Asp Glu Leu Asn Ser Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Val Thr Glu Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Gly Gly Glu Ser Phe Lys Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Val Gly Gly Val Tyr Leu Asp Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300
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```
Ser Val Thr Val Asp Phe Trp Glu Met Val Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Ala Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510
```

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Gln Gln Met Ala Ser Leu Ala Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Lys Asn Tyr Phe Glu Gly Ser Leu Gly Glu
530 535 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Thr Val Val Asp Lys Glu Tyr
545 550 555 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
565 570 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
580 585 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
595 600 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
610 615 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625 630 635 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
645 650 655

Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser Thr
660 665 670

Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
675 680 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Val
690 695 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Arg Val Lys Asp
705 710 715 720

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```
Lys Val Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
                725                 730                 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
            740                 745                 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
        755                 760                 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
    770                 775                 780

Lys Ile Ile Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785                 790                 795                 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
                805                 810                 815

Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
            820                 825                 830

Thr Gln Val Val Glu Gly Arg Ile Glu Glu Ala Lys Ser Leu Thr Ser
        835                 840                 845

Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser Ile
    850                 855                 860

Ser Asp Ala Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Glu Glu Ser
865                 870                 875                 880

His Phe Ile Ser Phe Glu Asp Ile Leu Glu Thr Asp Glu Gly Phe Ser
                885                 890                 895

Ile Arg Phe Ile Asp Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Ala Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
        915                 920                 925
```

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```
Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Ala Thr His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Val  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050

Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
    1055                1060                1065

Asn Leu  Thr Ala Ala Thr Thr  Ala Ile Ile Thr Ser  Ser Leu Gly
    1070                1075                1080

Ile Ala  Ser Gly Phe Ser Ile  Leu Leu Val Pro Leu  Ala Gly Ile
    1085                1090                1095

Ser Ala  Gly Ile Pro Ser Leu  Val Asn Asn Glu Leu  Ile Leu Arg
    1100                1105                1110

Asp Lys  Ala Thr Lys Val Val  Asp Tyr Phe Ser His  Ile Ser Leu
    1115                1120                1125
```

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```
Ala Glu  Ser Glu Gly Ala Phe  Thr Ser Leu Asp Asp  Lys Ile Met
    1130                1135                1140

Met Pro  Gln Asp Asp Leu Val  Ile Ser Glu Ile Asp  Phe Asn Asn
    1145                1150                1155

Asn Ser  Ile Thr Leu Gly Lys  Cys Glu Ile Trp Arg  Met Glu Gly
    1160                1165                1170

Gly Ser  Gly His Thr Val Thr  Asp Asp Ile Asp His  Phe Phe Ser
    1175                1180                1185

Ala Pro  Ser Ile Thr Tyr Arg  Glu Pro His Leu Ser  Ile Tyr Asp
    1190                1195                1200

Val Leu  Glu Val Gln Lys Glu  Glu Leu Asp Leu Ser  Lys Asp Leu
    1205                1210                1215

Met Val  Leu Pro Asn Ala Pro  Asn Arg Val Phe Ala  Trp Glu Thr
    1220                1225                1230

Gly Trp  Thr Pro Gly Leu Arg  Ser Leu Glu Asn Asp  Gly Thr Lys
    1235                1240                1245

Leu Leu  Asp Arg Ile Arg Asp  Asn Tyr Glu Gly Glu  Phe Tyr Trp
    1250                1255                1260

Arg Tyr  Phe Ala Phe Ile Ala  Asp Ala Leu Ile Thr  Thr Leu Lys
    1265                1270                1275

Pro Arg  Tyr Glu Asp Thr Asn  Ile Arg Ile Asn Leu  Asp Ser Asn
    1280                1285                1290

Thr Arg  Ser Phe Ile Val Pro  Val Ile Thr Thr Glu  Tyr Ile Arg
    1295                1300                1305

Glu Lys  Leu Ser Tyr Ser Phe  Tyr Gly Ser Gly Gly  Thr Tyr Ala
    1310                1315                1320
```

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```
Leu Ser  Leu Ser Gln Tyr Asn  Met Asn Ile Asn Ile  Glu Leu Asn
    1325                1330                1335

Glu Asn  Asp Thr Trp Val Ile  Asp Val Asp Asn Val  Val Arg Asp
    1340                1345                1350

Val Thr  Ile Glu Ser Asp Lys  Ile Lys Lys Gly Asp  Leu Ile Glu
    1355                1360                1365

Asn Ile  Leu Ser Lys Leu Ser  Ile Glu Asp Asn Lys  Ile Ile Leu
    1370                1375                1380

Asp Asn  His Glu Ile Asn Phe  Ser Gly Thr Leu Asn  Gly Gly Asn
    1385                1390                1395

Gly Phe  Val Ser Leu Thr Phe  Ser Ile Leu Glu Gly  Ile Asn Ala
    1400                1405                1410

Val Ile  Glu Val Asp Leu Leu  Ser Lys Ser Tyr Lys  Val Leu Ile
    1415                1420                1425

Ser Gly  Glu Leu Lys Thr Leu  Met Ala Asn Ser Asn  Ser Val Gln
    1430                1435                1440

Gln Lys  Ile Asp Tyr Ile Gly  Leu Asn Ser Glu Leu  Gln Lys Asn
    1445                1450                1455

Ile Pro  Tyr Ser Phe Met Asp  Asp Lys Gly Lys Glu  Asn Gly Phe
    1460                1465                1470

Ile Asn  Cys Ser Thr Lys Glu  Gly Leu Phe Val Ser  Glu Leu Ser
    1475                1480                1485

Asp Val  Val Leu Ile Ser Lys  Val Tyr Met Asp Asn  Ser Lys Pro
    1490                1495                1500

Leu Phe  Gly Tyr Cys Ser Asn  Asp Leu Lys Asp Val  Lys Val Ile
    1505                1510                1515
```

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```
Thr Lys  Asp Asp Val Ile Ile  Leu Thr Gly Tyr Tyr  Leu Lys Asp
    1520                1525                1530

Asp Ile  Lys Ile Ser Leu Ser  Phe Thr Ile Gln Asp  Glu Asn Thr
    1535                1540                1545

Ile Lys  Leu Asn Gly Val Tyr  Leu Asp Glu Asn Gly  Val Ala Glu
    1550                1555                1560

Ile Leu  Lys Phe Met Asn Lys  Lys Gly Ser Thr Asn  Thr Ser Asp
    1565                1570                1575

Ser Leu  Met Ser Phe Leu Glu  Ser Met Asn Ile Lys  Ser Ile Phe
    1580                1585                1590

Ile Asn  Ser Leu Gln Ser Asn  Thr Lys Leu Ile Leu  Asp Thr Asn
    1595                1600                1605

Phe Ile  Ile Ser Gly Thr Thr  Ser Ile Gly Gln Phe  Glu Phe Ile
    1610                1615                1620

Cys Asp  Lys Asp Asn Asn Ile  Gln Pro Tyr Phe Ile  Lys Phe Asn
    1625                1630                1635

Thr Leu  Glu Thr Lys Tyr Thr  Leu Tyr Val Gly Asn  Arg Gln Asn
    1640                1645                1650

Met Ile  Val Glu Pro Asn Tyr  Asp Leu Asp Asp Ser  Gly Asp Ile
    1655                1660                1665

Ser Ser  Thr Val Ile Asn Phe  Ser Gln Lys Tyr Leu  Tyr Gly Ile
    1670                1675                1680

Asp Ser  Cys Val Asn Lys Val  Ile Ile Ser Pro Asn  Ile Tyr Thr
    1685                1690                1695

Asp Glu  Ile Asn Ile Thr Pro  Ile Tyr Glu Ala Asn  Asn Thr Tyr
    1700                1705                1710
```

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Pro Glu Val Ile Val Leu Asp Thr Asn Tyr Ile Ser Glu Lys Ile
1715 1720 1725

Asn Ile Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Ser Asp Phe Ile Leu Met Ser Thr Asp Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Thr Asn Val Phe Lys Gly Asn
1760 1765 1770

Thr Ile Ser Asp Lys Ile Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Ser Ile Asn Lys Val Ile Ser Thr Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Val Glu Gly Leu Leu Asn Tyr Asp Leu Gly Leu Ile Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Val Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Ile
1835 1840 1845

Lys Asn Leu Ile Thr Gly Phe Thr Thr Ile Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Asp Asn Gly Gly Ala Ala Ser Val Gly Glu Thr
1865 1870 1875

Ile Ile Asp Gly Lys Asn Tyr Tyr Phe Ser Gln Asn Gly Val Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala
1895 1900 1905

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```
Pro Ala  Asp Thr Leu Asp Glu  Asn Leu Glu Gly Glu  Ala Ile Asp
    1910                1915                1920

Phe Thr  Gly Lys Leu Thr Ile  Asp Glu Asn Val Tyr  Tyr Phe Gly
    1925                1930                1935

Asp Asn  Tyr Arg Ala Ala Ile  Glu Trp Gln Thr Leu  Asp Asp Glu
    1940                1945                1950

Val Tyr  Tyr Phe Ser Thr Asp  Thr Gly Arg Ala Phe  Lys Gly Leu
    1955                1960                1965

Asn Gln  Ile Gly Asp Asp Lys  Phe Tyr Phe Asn Ser  Asp Gly Ile
    1970                1975                1980

Met Gln  Lys Gly Phe Val Asn  Ile Asn Asp Lys Thr  Phe Tyr Phe
    1985                1990                1995

Asp Asp  Ser Gly Val Met Lys  Ser Gly Tyr Thr Glu  Ile Asp Gly
    2000                2005                2010

Lys Tyr  Phe Tyr Phe Ala Glu  Asn Gly Glu Met Gln  Ile Gly Val
    2015                2020                2025

Phe Asn  Thr Ala Asp Gly Phe  Lys Tyr Phe Ala His  His Asp Glu
    2030                2035                2040

Asp Leu  Gly Asn Glu Glu Gly  Glu Ala Leu Ser Tyr  Ser Gly Ile
    2045                2050                2055

Leu Asn  Phe Asn Asn Lys Ile  Tyr Tyr Phe Asp Asp  Ser Phe Thr
    2060                2065                2070

Ala Val  Val Gly Trp Lys Asp  Leu Glu Asp Gly Ser  Lys Tyr Tyr
    2075                2080                2085

Phe Asp  Glu Asp Thr Ala Glu  Ala Tyr Ile Gly Ile  Ser Ile Ile
    2090                2095                2100
```

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Asn Asp Gly Lys Tyr Tyr Phe Asn Asp Ser Gly Ile Met Gln Ile
2105 2110 2115

Gly Phe Val Thr Ile Asn Asn Glu Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Val Glu Ser Gly Met Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Glu Asn Gly Leu Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asp Pro Glu Thr Lys Lys Ala Tyr Lys Gly Ile Asn Val Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Asn Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Thr Phe Glu Asp Asn His Tyr Tyr Phe Asn Glu Asp Gly
2255 2260 2265

Ile Met Gln Tyr Gly Tyr Leu Asn Ile Glu Asp Lys Thr Phe Tyr
2270 2275 2280

Phe Ser Glu Asp Gly Ile Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

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Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 334
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 334

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn

85 90 95

Leu His Phe Val Ala Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
130 135 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145 150 155 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
165 170 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
180 185 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
195 200 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
210 215 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225 230 235 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
260 265 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Ala Met
275 280 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser

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    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Phe Lys Thr Asn Ile Ser Gln Ser Thr Glu
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            500                 505                 510

Gln Gln Met Ala Ser Leu Ala Ser Phe Asp Asp Ala Arg Ala Lys Ala
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545                 550                 555                 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
            580                 585                 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
        595                 600                 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
    610                 615                 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625                 630                 635                 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
                645                 650                 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
            660                 665                 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
        675                 680                 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
    690                 695                 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
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705 710 715 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
725 730 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
740 745 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
755 760 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
770 775 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785 790 795 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
805 810 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
820 825 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
835 840 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
850 855 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865 870 875 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
885 890 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
900 905 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile

915 920 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
930 935 940

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945 950 955 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
965 970 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
980 985 990

Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp Ala Ala Lys Val Val Glu
995 1000 1005

Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu Pro Thr
1010 1015 1020

Leu Ser Glu Gly Leu Pro Ile Ile Ala Thr Ile Ile Asp Gly Val
1025 1030 1035

Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp Pro
1040 1045 1050

Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala Val
1055 1060 1065

Asn Leu Thr Thr Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu Gly
1070 1075 1080

Ile Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile
1085 1090 1095

Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg
1100 1105 1110

Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Val Ser Leu

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1115 1120 1125

Val Glu Thr Glu Gly Val Phe Thr Leu Leu Asp Asp Lys Ile Met
1130 1135 1140

Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala

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1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile Leu
1370 1375 1380

Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile

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1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Asp Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys Thr
1535 1540 1545

Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Arg Lys Gly Asn Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe
1580 1585 1590

Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr Tyr

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1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala

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1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Tyr Lys Tyr Tyr Phe Asn Ser Asp Gly Val
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile

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2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro

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2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 335
<211> 2366
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 335

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Val Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Thr Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Ile
65 70 75 80

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Glu Ile Leu Glu Leu Lys Asn Ser Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Ile Ala Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Ile Glu Ser Ala Ser Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Glu Phe Asn His Thr Ala Phe Phe Arg Lys Arg Met Gln
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Gln Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Lys Glu Glu Asn Pro Asp Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Asp Ile Asp Glu Leu Asn Ala Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Val Thr Glu Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Thr Gly Glu Val Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Gly Ala Ser Asp Ile Leu Arg
            260                 265                 270

Val Ala Ile Leu Lys Asn Ile Gly Gly Val Tyr Leu Asp Val Ala Met
        275                 280                 285
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```
Leu Pro Gly Ile His Pro Asp Leu Phe Lys Asp Ile Asn Lys Pro Asp
    290                 295                 300

Ser Val Lys Thr Ala Val Asp Trp Glu Glu Met Gln Leu Glu Ala Ile
305                 310                 315                 320

Met Lys His Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Lys His Phe Asp
                325                 330                 335

Thr Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
            340                 345                 350

Lys Ser Asp Lys Ser Glu Ile Phe Leu Pro Leu Gly Asp Ile Glu Val
        355                 360                 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Ala Lys Gly Ser Ile Ile Asn
    370                 375                 380

Gln Ala Leu Ile Ser Ala Lys Asp Ser Tyr Cys Ser Asp Leu Leu Ile
385                 390                 395                 400

Lys Gln Ile Gln Asn Arg Tyr Lys Ile Leu Asn Asp Thr Leu Gly Pro
                405                 410                 415

Ile Ile Ser Gln Gly Asn Asp Phe Asn Thr Thr Met Asn Asn Phe Gly
            420                 425                 430

Glu Ser Leu Gly Ala Ile Ala Asn Glu Glu Asn Ile Ser Phe Ile Ala
        435                 440                 445

Lys Ile Gly Ser Tyr Leu Arg Val Gly Phe Tyr Pro Glu Ala Asn Thr
    450                 455                 460

Thr Ile Thr Leu Ser Gly Pro Thr Ile Tyr Ala Gly Ala Tyr Lys Asp
465                 470                 475                 480

Leu Leu Thr Phe Lys Glu Met Ser Ile Asp Thr Ser Ile Leu Ser Ser
                485                 490                 495
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Glu Leu Arg Asn Phe Glu Phe Pro Lys Val Asn Ile Ser Gln Ala Thr
500 505 510

Glu Gln Gln Lys Asn Ser Leu Ala Gln Phe Asn Glu Glu Arg Ala Lys
515 520 525

Ile Gln Phe Glu Glu Tyr Lys Lys Asn Tyr Phe Glu Gly Ala Leu Gly
530 535 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Thr Val Thr Asp Lys Glu
545 550 555 560

Tyr Leu Leu Glu Lys Ile Ser Ser Ser Thr Lys Ser Ser Glu Arg Gly
565 570 575

Tyr Val His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
580 585 590

Ala Ala Cys Asn Leu Phe Ala Lys Asn Pro Tyr Asp Ser Ile Leu Phe
595 600 605

Gln Lys Asn Ile Glu Asp Ser Glu Val Ala Tyr Tyr Tyr Asn Pro Thr
610 615 620

Asp Ser Glu Ile Gln Glu Ile Asp Lys Tyr Arg Ile Pro Asp Arg Ile
625 630 635 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Ala
645 650 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser
660 665 670

Ser Glu Ile Glu Thr Ala Ile Gly Leu Ala Lys Glu Asp Ile Ser Pro
675 680 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser
690 695 700

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```
Val Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Arg Val Lys
705                 710                 715                 720

Asp Lys Val Ser Glu Leu Met Pro Ser Met Ser Gln Asp Ser Ile Ile
                725                 730                 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg
            740                 745                 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
        755                 760                 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
    770                 775                 780

Asn Lys Ile Ile Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785                 790                 795                 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu
                805                 810                 815

Glu Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
            820                 825                 830

Glu Thr Gln Val Val Glu Glu Arg Ile Glu Glu Ala Lys Ser Leu Thr
        835                 840                 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser
    850                 855                 860

Ile Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp
865                 870                 875                 880

Ser His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe
                885                 890                 895

Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
            900                 905                 910
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Thr Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu
        915                 920                 925

Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
    930                 935                 940

Val Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn
945                 950                 955                 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu
                965                 970                 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
            980                 985                 990

Leu Phe Ser Thr Gly Leu Asn Thr  Ile Thr Asp Ala Ala  Lys Val Val
        995                 1000                1005

Glu Leu  Val Ser Thr Ala Leu  Asp Glu Thr Ile Asp  Leu Leu Pro
    1010                1015                1020

Thr Leu  Ser Glu Gly Leu Pro  Ile Ile Ala Thr Ile  Ile Asp Gly
    1025                1030                1035

Val Ser  Leu Gly Ala Ala Ile  Lys Glu Leu Ser Glu  Thr Ser Asp
    1040                1045                1050

Pro Leu  Leu Arg Gln Glu Ile  Glu Ala Lys Ile Gly  Ile Met Ala
    1055                1060                1065

Val Asn  Leu Thr Thr Ala Thr  Thr Ala Ile Ile Thr  Ser Ser Leu
    1070                1075                1080

Gly Ile  Ala Ser Gly Phe Ser  Ile Leu Leu Val Pro  Leu Ala Gly
    1085                1090                1095

Ile Ser  Ala Gly Ile Pro Ser  Leu Val Asn Asn Glu  Leu Val Leu
    1100                1105                1110
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Arg Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Val Ser
1115 1120 1125

Leu Val Glu Thr Glu Gly Val Phe Thr Leu Leu Asp Asp Lys Val
1130 1135 1140

Met Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn
1145 1150 1155

Asn Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu
1160 1165 1170

Gly Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe
1175 1180 1185

Ser Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr
1190 1195 1200

Asp Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp
1205 1210 1215

Leu Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu
1220 1225 1230

Thr Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr
1235 1240 1245

Lys Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr
1250 1255 1260

Trp Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu
1265 1270 1275

Lys Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser
1280 1285 1290

Asn Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile
1295 1300 1305

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Arg Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr
1310 1315 1320

Ala Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu
1325 1330 1335

Ser Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg
1340 1345 1350

Asp Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile
1355 1360 1365

Glu Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile
1370 1375 1380

Leu Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser
1385 1390 1395

Asn Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn
1400 1405 1410

Ala Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu
1415 1420 1425

Ile Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile
1430 1435 1440

Gln Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys
1445 1450 1455

Asn Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly
1460 1465 1470

Phe Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu
1475 1480 1485

Pro Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys
1490 1495 1500

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```
Pro Ser  Phe Gly Tyr Tyr Ser  Asn Asn Leu Lys Asp  Val Lys Val
    1505                1510                1515

Ile Thr  Lys Asp Asn Val Asn  Ile Leu Thr Gly Tyr  Tyr Leu Lys
    1520                1525                1530

Asp Asp  Ile Lys Ile Ser Leu  Ser Leu Thr Leu Gln  Asp Glu Lys
    1535                1540                1545

Thr Ile  Lys Leu Asn Ser Val  His Leu Asp Glu Ser  Gly Val Ala
    1550                1555                1560

Glu Ile  Leu Lys Phe Met Asn  Arg Lys Gly Ser Thr  Asn Thr Ser
    1565                1570                1575

Asp Ser  Leu Met Ser Phe Leu  Glu Ser Met Asn Ile  Lys Ser Ile
    1580                1585                1590

Phe Val  Asn Phe Leu Gln Ser  Asn Ile Lys Phe Ile  Leu Asp Ala
    1595                1600                1605

Asn Phe  Ile Ile Ser Gly Thr  Thr Ser Ile Gly Gln  Phe Glu Phe
    1610                1615                1620

Ile Cys  Asp Glu Asn Asn Asn  Ile Gln Pro Tyr Phe  Ile Lys Phe
    1625                1630                1635

Asn Thr  Leu Glu Thr Asn Tyr  Thr Leu Tyr Val Gly  Asn Arg Gln
    1640                1645                1650

Asn Met  Ile Val Glu Pro Asn  Tyr Asp Leu Asp Asp  Ser Gly Asp
    1655                1660                1665

Ile Ser  Ser Thr Val Ile Asn  Phe Ser Gln Lys Tyr  Leu Tyr Gly
    1670                1675                1680

Ile Asp  Ser Cys Val Asn Lys  Val Val Ile Ser Pro  Asn Ile Tyr
    1685                1690                1695
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Thr Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr
1700 1705 1710

Tyr Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys
1715 1720 1725

Ile Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser
1730 1735 1740

Asn Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn
1745 1750 1755

Lys Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp
1760 1765 1770

Lys Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln
1775 1780 1785

Asp Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr
1790 1795 1800

Tyr Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu
1805 1810 1815

Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser
1820 1825 1830

Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro
1835 1840 1845

Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys
1850 1855 1860

Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu
1865 1870 1875

Thr Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val
1880 1885 1890

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Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
1895 1900 1905

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile
1910 1915 1920

Asp Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe
1925 1930 1935

Glu Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly
1940 1945 1950

Glu Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly
1955 1960 1965

Leu Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly
1970 1975 1980

Val Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr
1985 1990 1995

Phe Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp
2000 2005 2010

Gly Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly
2015 2020 2025

Val Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn
2030 2035 2040

Glu Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly
2045 2050 2055

Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe
2060 2065 2070

Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr
2075 2080 2085

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Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu
2090 2095 2100

Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln
2105 2110 2115

Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp
2120 2125 2130

Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
2135 2140 2145

Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp
2150 2155 2160

Thr Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn
2165 2170 2175

Asp Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg
2180 2185 2190

Val Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu
2195 2200 2205

Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr
2210 2215 2220

Phe Asp Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile
2225 2230 2235

Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr
2240 2245 2250

Gly Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn
2255 2260 2265

Gly Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe
2270 2275 2280

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Tyr Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr
2285 2290 2295

Pro Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu
2300 2305 2310

Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu
2315 2320 2325

Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr
2330 2335 2340

Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp
2345 2350 2355

Thr Ala Gln Leu Val Ile Ser Glu
2360 2365

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<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 336

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr

65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Ala Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
130 135 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145 150 155 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
165 170 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
180 185 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
195 200 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
210 215 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225 230 235 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
260 265 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Ala Met

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        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
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485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Gln Met Ala Ser Leu Ala Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
530 535 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545 550 555 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
565 570 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
580 585 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
595 600 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
610 615 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625 630 635 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
645 650 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
660 665 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
675 680 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile

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690 695 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705 710 715 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
725 730 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
740 745 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
755 760 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
770 775 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785 790 795 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
805 810 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
820 825 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
835 840 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
850 855 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865 870 875 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
885 890 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr

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            900                 905                 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
        915                 920                 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Ile  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050

Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
    1055                1060                1065

Asn Leu  Thr Thr Ala Thr Thr  Ala Ile Ile Thr Ser  Ser Leu Gly
    1070                1075                1080

Val Ala  Ser Gly Phe Ser Ile  Leu Leu Val Pro Leu  Ala Gly Ile
    1085                1090                1095

Ser Ala  Gly Ile Pro Ser Leu  Val Asn Asn Glu Leu  Val Leu Arg
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    1100                1105                1110

Asp Lys  Ala Thr Lys Val Val  Asp Tyr Phe Lys His  Val Ser Leu
    1115                1120                1125

Val Glu  Thr Glu Gly Val Phe  Thr Leu Leu Asp Asp  Lys Ile Met
    1130                1135                1140

Met Pro  Gln Asp Asp Leu Val  Ile Ser Glu Ile Asp  Phe Asn Asn
    1145                1150                1155

Asn Ser  Ile Val Leu Gly Lys  Cys Glu Ile Trp Arg  Met Glu Gly
    1160                1165                1170

Gly Ser  Gly His Thr Val Thr  Asp Asp Ile Asp His  Phe Phe Ser
    1175                1180                1185

Ala Pro  Ser Ile Thr Tyr Arg  Glu Pro His Leu Ser  Ile Tyr Asp
    1190                1195                1200

Val Leu  Glu Val Gln Lys Glu  Glu Leu Asp Leu Ser  Lys Asp Leu
    1205                1210                1215

Met Val  Leu Pro Asn Ala Pro  Asn Arg Val Phe Ala  Trp Glu Thr
    1220                1225                1230

Gly Trp  Thr Pro Gly Leu Arg  Ser Leu Glu Asn Asp  Gly Thr Lys
    1235                1240                1245

Leu Leu  Asp Arg Ile Arg Asp  Asn Tyr Glu Gly Glu  Phe Tyr Trp
    1250                1255                1260

Arg Tyr  Phe Ala Phe Ile Ala  Asp Ala Leu Ile Thr  Thr Leu Lys
    1265                1270                1275

Pro Arg  Tyr Glu Asp Thr Asn  Ile Arg Ile Asn Leu  Asp Ser Asn
    1280                1285                1290

Thr Arg  Ser Phe Ile Val Pro  Ile Ile Thr Thr Glu  Tyr Ile Arg
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1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile Leu
1370 1375 1380

Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro

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1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys Thr
1535 1540 1545

Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Arg Lys Gly Asn Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe
1580 1585 1590

Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr

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1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu

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1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Tyr Lys Tyr Tyr Phe Asn Ser Asp Gly Val
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr

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2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr

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2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 337
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 337

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

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Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Ala Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270
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Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Ala Met
275 280 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
290 295 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

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```
Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Gln Met Ala Ser Leu Ala Thr Phe Asp Asp Ala Arg Ala Lys Val
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545                 550                 555                 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
            580                 585                 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Ile Leu Phe Gln
        595                 600                 605

Lys Asn Ile Glu Asn Ser Glu Val Ala Tyr Tyr Tyr Asn Pro Gly Asp
    610                 615                 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Arg Ile Pro Ser Ile Ile Ser
625                 630                 635                 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
                645                 650                 655

Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser Thr
            660                 665                 670

Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Ser Lys
        675                 680                 685
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Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
    690                 695                 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705                 710                 715                 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
                725                 730                 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Asn Glu Gly Arg Arg Glu
            740                 745                 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
        755                 760                 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
    770                 775                 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785                 790                 795                 800

Gln Glu Ile Arg Asn Asn Ser Asn Leu Ser Asp Ile Glu Leu Glu Glu
                805                 810                 815

Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
            820                 825                 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
        835                 840                 845

Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser Ile
    850                 855                 860

Ser Asp Ser Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Asp Asp Ser
865                 870                 875                 880

His Phe Ile Ser Phe Glu Asp Ile Ser Lys Thr Glu Asp Gly Phe Ser
                885                 890                 895
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Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Glu Ile Phe Ser Glu Tyr Ala Asn His Ile Glu Arg Glu Ile
        915                 920                 925

Ser Asn Ile Lys Asp Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Ala Ile His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Gly Tyr Ser Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Val  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050

Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
    1055                1060                1065

Asn Leu  Thr Ala Ala Thr Thr  Ala Ile Ile Thr Ser  Ser Leu Gly
    1070                1075                1080

Ile Ala  Ser Gly Phe Ser Ile  Leu Leu Val Pro Leu  Ala Gly Ile
    1085                1090                1095
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Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg
1100 1105 1110

Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Ile Ser Leu
1115 1120 1125

Val Glu Thr Glu Gly Ala Phe Thr Leu Leu Asp Asp Lys Ile Met
1130 1135 1140

Ile Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asn Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ser Pro Thr Ile Thr Tyr Ile Lys Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Glu Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp His Tyr Lys Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

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Asn Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu His Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe His Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Asp Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Asp Asn Lys Ile Ile Leu
1370 1375 1380

Asn His His Glu Ile Asn Phe Ser Gly Asp Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Ile Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

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```
Asp Val  Val Leu Ile Ser Lys  Val Tyr Met Asp Asp  Ser Lys Pro
    1490                 1495                 1500

Ser Phe  Gly Tyr Tyr Ser Asn  Asn Leu Lys Asp Val  Lys Val Ile
    1505                 1510                 1515

Thr Lys  Asp Asn Val Asn Ile  Leu Thr Gly Tyr Tyr  Leu Lys Asp
    1520                 1525                 1530

Asp Ile  Lys Ile Ser Leu Ser  Phe Thr Leu Gln Asp  Glu Lys Thr
    1535                 1540                 1545

Ile Lys  Leu Asn Gly Val His  Leu Asp Glu Ser Gly  Val Ala Glu
    1550                 1555                 1560

Ile Leu  Lys Phe Met Asn Lys  Lys Gly Ser Thr Asn  Thr Ser Asp
    1565                 1570                 1575

Ser Leu  Met Ser Phe Leu Glu  Ser Val Asn Ile Lys  Ser Ile Phe
    1580                 1585                 1590

Val Asn  Phe Leu Gln Ser Lys  Ile Asn Phe Ile Leu  Asp Ala Asn
    1595                 1600                 1605

Phe Ile  Ile Ser Gly Thr Thr  Ser Ile Gly Gln Phe  Glu Phe Ile
    1610                 1615                 1620

Cys Asp  Glu Asn Asp Asn Ile  Gln Pro Tyr Phe Ile  Lys Phe Asn
    1625                 1630                 1635

Thr Leu  Glu Thr Thr Tyr Thr  Leu Tyr Val Gly Asn  Arg Gln Asn
    1640                 1645                 1650

Met Ile  Val Glu Pro Asn Tyr  Asp Leu Asp Asp Ser  Gly Asp Ile
    1655                 1660                 1665

Ser Ser  Thr Val Ile Asn Phe  Ser Gln Lys Tyr Leu  Tyr Gly Ile
    1670                 1675                 1680
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Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Asn Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Ser Ala Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Thr Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

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```
Ile Ile  Asn Asp Lys Asn Tyr  Tyr Phe Asn Gln Ser  Gly Ile Leu
    1880                1885                1890

Gln Thr  Gly Val Phe Ser Thr  Glu Asp Gly Leu Lys  Tyr Phe Ala
    1895                1900                1905

Pro Ala  Asn Thr Leu Asp Glu  Asn Leu Glu Gly Glu  Ala Ile Asp
    1910                1915                1920

Phe Thr  Gly Lys Leu Ile Ile  Asp Glu Asn Ile Tyr  Tyr Phe Glu
    1925                1930                1935

Asp Asn  Tyr Arg Gly Ala Val  Glu Trp Lys Glu Leu  Asp Gly Glu
    1940                1945                1950

Met Tyr  Tyr Phe Ser Pro Glu  Thr Gly Lys Ala Phe  Lys Gly Leu
    1955                1960                1965

Asn Gln  Ile Gly Asp Asp Lys  Tyr Tyr Phe Asn Ser  Asp Gly Ile
    1970                1975                1980

Met Gln  Lys Gly Phe Val Ser  Ile Asn Asp Lys Lys  Tyr Tyr Phe
    1985                1990                1995

Asp Asp  Ser Gly Val Met Lys  Val Gly Tyr Ile Glu  Ile Asp Gly
    2000                2005                2010

Lys Tyr  Phe Tyr Phe Ala Glu  Asn Gly Glu Met Gln  Ile Gly Val
    2015                2020                2025

Phe Asn  Thr Ser Asp Gly Phe  Lys Tyr Phe Ala His  His Asn Glu
    2030                2035                2040

Asp Leu  Gly Asn Glu Glu Gly  Glu Ala Ile Ser Tyr  Ser Gly Ile
    2045                2050                2055

Leu Asn  Phe Asn Asn Lys Ile  Tyr Tyr Phe Asp Tyr  Ser Phe Thr
    2060                2065                2070
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Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Val Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asn Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Glu Lys Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Glu Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Asp Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Ile Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Asn Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asp Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

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Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Gln
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 338
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 338

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys

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50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Ala Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
130 135 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145 150 155 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
165 170 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
180 185 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
195 200 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
210 215 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225 230 235 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg

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260 265 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Ala Met
275 280 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
290 295 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu

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465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Gln Met Ala Ser Leu Ala Ser Phe Asp Asp Ala Arg Ala Lys Ala
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545                 550                 555                 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
            580                 585                 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
        595                 600                 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
    610                 615                 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625                 630                 635                 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
                645                 650                 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
            660                 665                 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
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675 680 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
690 695 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705 710 715 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
725 730 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
740 745 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
755 760 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
770 775 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785 790 795 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
805 810 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
820 825 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
835 840 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
850 855 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865 870 875 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser

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                885                 890                 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
        915                 920                 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Ile  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050

Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
    1055                1060                1065

Asn Leu  Thr Thr Ala Thr Thr  Ala Ile Ile Thr Ser  Ser Leu Gly
    1070                1075                1080

Ile Ala  Ser Gly Phe Ser Ile  Leu Leu Val Pro Leu  Ala Gly Ile
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1085 1090 1095

Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg
1100 1105 1110

Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Val Ser Leu
1115 1120 1125

Val Glu Thr Glu Gly Val Phe Thr Leu Leu Asp Asp Lys Ile Met
1130 1135 1140

Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn

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1280 1285 1290

Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile Leu
1370 1375 1380

Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro

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1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys Thr
1535 1540 1545

Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Arg Lys Gly Asn Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe
1580 1585 1590

Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile

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1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr

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1865 1870 1875

Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Val
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr

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2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly

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2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

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<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

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Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

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```
Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Ala Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu Gln
                245                 250                 255
```

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```
Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460
```

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```
Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Gln Met Ala Ser Leu Ala Thr Phe Asp Asp Ala Arg Ala Lys Val
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545                 550                 555                 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
            580                 585                 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Ile Leu Phe Gln
        595                 600                 605

Lys Asn Ile Glu Asn Ser Glu Val Ala Tyr Tyr Tyr Asn Pro Gly Asp
    610                 615                 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Arg Ile Pro Ser Ile Ile Ser
625                 630                 635                 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
                645                 650                 655

Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser Thr
            660                 665                 670
```

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```
Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Ser Lys
        675                 680                 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
    690                 695                 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705                 710                 715                 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
                725                 730                 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Asn Glu Gly Arg Arg Glu
            740                 745                 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
        755                 760                 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
    770                 775                 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785                 790                 795                 800

Gln Glu Ile Arg Asn Asn Ser Asn Leu Ser Asp Ile Glu Leu Glu Glu
                805                 810                 815

Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
            820                 825                 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
        835                 840                 845

Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser Ile
    850                 855                 860

Ser Asp Ser Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Asp Asp Ser
865                 870                 875                 880
```

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```
His Phe Ile Ser Phe Glu Asp Ile Ser Lys Thr Glu Asp Gly Phe Ser
                885                 890                 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Glu Ile Phe Ser Glu Tyr Ala Asn His Ile Glu Arg Glu Ile
        915                 920                 925

Ser Asn Ile Lys Asp Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Ala Ile His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Gly Tyr Ser Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Val  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050

Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
    1055                1060                1065

Asn Leu  Thr Ala Ala Thr Thr  Ala Ile Ile Thr Ser  Ser Leu Gly
    1070                1075                1080
```

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```
Ile Ala  Ser Gly Phe Ser Ile  Leu Leu Val Pro Leu  Ala Gly Ile
    1085                1090                1095

Ser Ala  Gly Ile Pro Ser Leu  Val Asn Asn Glu Leu  Val Leu Arg
    1100                1105                1110

Asp Lys  Ala Thr Lys Val Val  Asp Tyr Phe Lys His  Ile Ser Leu
    1115                1120                1125

Val Glu  Thr Glu Gly Ala Phe  Thr Leu Leu Asp Asp  Lys Ile Met
    1130                1135                1140

Ile Pro  Gln Asp Asp Leu Val  Ile Ser Glu Ile Asp  Phe Asn Asn
    1145                1150                1155

Asn Ser  Ile Val Leu Gly Lys  Cys Glu Ile Trp Arg  Met Glu Gly
    1160                1165                1170

Gly Ser  Gly His Thr Val Thr  Asn Asp Ile Asp His  Phe Phe Ser
    1175                1180                1185

Ser Pro  Thr Ile Thr Tyr Ile  Lys Pro His Leu Ser  Ile Tyr Asp
    1190                1195                1200

Val Leu  Glu Val Gln Lys Glu  Glu Leu Asp Leu Ser  Lys Asp Leu
    1205                1210                1215

Met Val  Leu Pro Asn Ala Pro  Asn Arg Val Phe Ala  Trp Glu Thr
    1220                1225                1230

Gly Trp  Thr Pro Gly Leu Arg  Ser Leu Glu Asn Glu  Gly Thr Lys
    1235                1240                1245

Leu Leu  Asp Arg Ile Arg Asp  His Tyr Lys Gly Glu  Phe Tyr Trp
    1250                1255                1260

Arg Tyr  Phe Ala Phe Ile Ala  Asp Ala Leu Ile Thr  Thr Leu Lys
    1265                1270                1275
```

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Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Asn Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu His Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe His Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Asp Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Asp Asn Lys Ile Ile Leu
1370 1375 1380

Asn His His Glu Ile Asn Phe Ser Gly Asp Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Ile Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

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```
Ile Asn  Gly Ser Thr Lys Glu  Gly Leu Phe Val Ser  Glu Leu Pro
    1475                1480                1485

Asp Val  Val Leu Ile Ser Lys  Val Tyr Met Asp Asp  Ser Lys Pro
    1490                1495                1500

Ser Phe  Gly Tyr Tyr Ser Asn  Asn Leu Lys Asp Val  Lys Val Ile
    1505                1510                1515

Thr Lys  Asp Asn Val Asn Ile  Leu Thr Gly Tyr Tyr  Leu Lys Asp
    1520                1525                1530

Asp Ile  Lys Ile Ser Leu Ser  Phe Thr Leu Gln Asp  Glu Lys Thr
    1535                1540                1545

Ile Lys  Leu Asn Gly Val His  Leu Asp Glu Ser Gly  Val Ala Glu
    1550                1555                1560

Ile Leu  Lys Phe Met Asn Lys  Lys Gly Ser Thr Asn  Thr Ser Asp
    1565                1570                1575

Ser Leu  Met Ser Phe Leu Glu  Ser Val Asn Ile Lys  Ser Ile Phe
    1580                1585                1590

Val Asn  Phe Leu Gln Ser Lys  Ile Asn Phe Ile Leu  Asp Ala Asn
    1595                1600                1605

Phe Ile  Ile Ser Gly Thr Thr  Ser Ile Gly Gln Phe  Glu Phe Ile
    1610                1615                1620

Cys Asp  Glu Asn Asp Asn Ile  Gln Pro Tyr Phe Ile  Lys Phe Asn
    1625                1630                1635

Thr Leu  Glu Thr Thr Tyr Thr  Leu Tyr Val Gly Asn  Arg Gln Asn
    1640                1645                1650

Met Ile  Val Glu Pro Asn Tyr  Asp Leu Asp Asp Ser  Gly Asp Ile
    1655                1660                1665
```

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```
Ser Ser  Thr Val Ile Asn Phe  Ser Gln Lys Tyr Leu  Tyr Gly Ile
    1670                1675                1680

Asp Ser  Cys Val Asn Lys Val  Val Ile Ser Pro Asn  Ile Tyr Thr
    1685                1690                1695

Asp Glu  Ile Asn Ile Thr Pro  Val Tyr Glu Thr Asn  Asn Asn Tyr
    1700                1705                1710

Pro Glu  Val Ile Val Leu Asp  Ala Asn Tyr Ile Asn  Glu Lys Ile
    1715                1720                1725

Asn Val  Asn Ile Asn Asp Leu  Ser Ile Arg Tyr Val  Trp Ser Asn
    1730                1735                1740

Asp Gly  Asn Asp Phe Ile Leu  Met Ser Thr Ser Glu  Glu Asn Lys
    1745                1750                1755

Val Ser  Gln Val Lys Ile Arg  Phe Val Asn Val Phe  Lys Asp Lys
    1760                1765                1770

Thr Leu  Ala Asn Lys Leu Ser  Phe Asn Phe Ser Asp  Lys Gln Asp
    1775                1780                1785

Val Pro  Val Ser Glu Ile Ile  Ser Ala Phe Thr Pro  Ser Tyr Tyr
    1790                1795                1800

Glu Asp  Gly Leu Ile Gly Tyr  Asp Leu Gly Leu Val  Ser Leu Tyr
    1805                1810                1815

Asn Glu  Lys Phe Tyr Ile Asn  Asn Phe Gly Met Met  Val Ser Gly
    1820                1825                1830

Leu Ile  Tyr Ile Asn Asp Ser  Leu Tyr Tyr Phe Lys  Pro Pro Val
    1835                1840                1845

Asn Asn  Leu Ile Thr Gly Phe  Val Thr Val Gly Asp  Asp Lys Tyr
    1850                1855                1860
```

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```
Tyr Phe  Asn Pro Thr Asn Gly  Gly Ala Ala Ser Ile  Gly Glu Thr
    1865                1870                1875

Ile Ile  Asn Asp Lys Asn Tyr  Tyr Phe Asn Gln Ser  Gly Ile Leu
    1880                1885                1890

Gln Thr  Gly Val Phe Ser Thr  Glu Asp Gly Leu Lys  Tyr Phe Ala
    1895                1900                1905

Pro Ala  Asn Thr Leu Asp Glu  Asn Leu Glu Gly Glu  Ala Ile Asp
    1910                1915                1920

Phe Thr  Gly Lys Leu Ile Ile  Asp Glu Asn Ile Tyr  Tyr Phe Glu
    1925                1930                1935

Asp Asn  Tyr Arg Gly Ala Val  Glu Trp Lys Glu Leu  Asp Gly Glu
    1940                1945                1950

Met Tyr  Tyr Phe Ser Pro Glu  Thr Gly Lys Ala Phe  Lys Gly Leu
    1955                1960                1965

Asn Gln  Ile Gly Asp Asp Lys  Tyr Tyr Phe Asn Ser  Asp Gly Ile
    1970                1975                1980

Met Gln  Lys Gly Phe Val Ser  Ile Asn Asp Lys Lys  Tyr Tyr Phe
    1985                1990                1995

Asp Asp  Ser Gly Val Met Lys  Val Gly Tyr Ile Glu  Ile Asp Gly
    2000                2005                2010

Lys Tyr  Phe Tyr Phe Ala Glu  Asn Gly Glu Met Gln  Ile Gly Val
    2015                2020                2025

Phe Asn  Thr Ser Asp Gly Phe  Lys Tyr Phe Ala His  His Asn Glu
    2030                2035                2040

Asp Leu  Gly Asn Glu Glu Gly  Glu Ala Ile Ser Tyr  Ser Gly Ile
    2045                2050                2055
```

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```
Leu Asn  Phe Asn Asn Lys Ile  Tyr Tyr Phe Asp Tyr  Ser Phe Thr
    2060                2065                2070

Ala Val  Val Gly Trp Lys Asp  Leu Glu Asp Gly Ser  Lys Tyr Tyr
    2075                2080                2085

Phe Asp  Glu Asp Thr Ala Glu  Ala Tyr Val Gly Leu  Ser Leu Ile
    2090                2095                2100

Asn Asp  Gly Gln Tyr Tyr Phe  Asn Asp Asp Gly Ile  Met Gln Val
    2105                2110                2115

Gly Phe  Val Thr Ile Asn Asn  Lys Val Phe Tyr Phe  Ser Asp Ser
    2120                2125                2130

Gly Ile  Ile Glu Ser Gly Val  Gln Asn Ile Asp Asp  Asn Tyr Phe
    2135                2140                2145

Tyr Ile  Asp Glu Lys Gly Ile  Val Gln Ile Gly Val  Phe Asp Thr
    2150                2155                2160

Ser Asp  Glu Tyr Lys Tyr Phe  Ala Pro Ala Asn Thr  Val Asn Asp
    2165                2170                2175

Asn Ile  Tyr Gly Gln Ala Val  Asp Tyr Ser Gly Leu  Val Arg Val
    2180                2185                2190

Gly Glu  Asp Ile Tyr Tyr Phe  Gly Glu Thr Tyr Thr  Ile Glu Thr
    2195                2200                2205

Gly Trp  Ile Tyr Asp Met Glu  Asn Glu Ser Asp Lys  Tyr Tyr Phe
    2210                2215                2220

Asn Pro  Glu Thr Lys Lys Ala  Cys Lys Gly Ile Asn  Leu Ile Asp
    2225                2230                2235

Asp Ile  Lys Tyr Tyr Phe Asp  Glu Asn Gly Ile Met  Arg Thr Gly
    2240                2245                2250
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Leu Ile Ser Phe Glu Asn Asn Asp Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Gln
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

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<400> 340

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Val Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu

```
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Thr Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Ile Leu Glu Leu Lys Asn Ser Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Ile Ala Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Ile Glu Ser Ala Ser Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Glu Phe Asn His Thr Ala Phe Phe Arg Lys Arg Met Gln
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Gln Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Lys Glu Glu Asn Pro Asp Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Asp Ile Asp Glu Leu Asn Ala Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Val Thr Glu Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Thr Gly Glu Val Phe Asn Leu Tyr Glu Gln
```

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245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Gly Ala Ser Asp Ile Leu Arg
260 265 270

Val Ala Ile Leu Lys Asn Ile Gly Gly Val Tyr Leu Asp Val Ala Met
275 280 285

Leu Pro Gly Ile His Pro Asp Leu Phe Lys Asp Ile Asn Lys Pro Asp
290 295 300

Ser Val Lys Thr Ala Val Asp Trp Glu Glu Met Gln Leu Glu Ala Ile
305 310 315 320

Met Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Lys His Phe Asp
325 330 335

Thr Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
340 345 350

Lys Ser Asp Lys Ser Glu Ile Phe Leu Pro Leu Gly Asp Ile Glu Val
355 360 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Ala Lys Gly Ser Ile Ile Asn
370 375 380

Gln Ala Leu Ile Ser Ala Lys Asp Ser Tyr Cys Ser Asp Leu Leu Ile
385 390 395 400

Lys Gln Ile Gln Asn Arg Tyr Lys Ile Leu Asn Asp Thr Leu Gly Pro
405 410 415

Ile Ile Ser Gln Gly Asn Asp Phe Asn Thr Thr Met Asn Asn Phe Gly
420 425 430

Glu Ser Leu Gly Ala Ile Ala Asn Glu Glu Asn Ile Ser Phe Ile Ala
435 440 445

Lys Ile Gly Ser Tyr Leu Arg Val Gly Phe Tyr Pro Glu Ala Asn Thr

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```
    450                 455                 460

Thr Ile Thr Leu Ser Gly Pro Thr Ile Tyr Ala Gly Ala Tyr Lys Asp
465                 470                 475                 480

Leu Leu Thr Phe Lys Glu Met Ser Ile Asp Thr Ser Ile Leu Ser Ser
                485                 490                 495

Glu Leu Arg Asn Phe Glu Phe Pro Lys Val Asn Ile Ser Gln Ala Thr
            500                 505                 510

Glu Gln Gln Lys Asn Ser Leu Ala Gln Phe Asn Glu Glu Arg Ala Lys
        515                 520                 525

Ile Gln Phe Glu Glu Tyr Lys Lys Asn Tyr Phe Glu Gly Ala Leu Gly
    530                 535                 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Thr Val Ile Asp Lys Glu
545                 550                 555                 560

Tyr Leu Leu Glu Lys Ile Ser Ser Ser Thr Lys Ser Ser Glu Arg Gly
                565                 570                 575

Tyr Val His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
            580                 585                 590

Ala Ala Cys Asn Leu Phe Ala Lys Asn Pro Tyr Asp Ser Ile Leu Phe
        595                 600                 605

Gln Lys Asn Ile Glu Asp Ser Glu Val Ala Tyr Tyr Tyr Asn Pro Thr
    610                 615                 620

Asp Ser Glu Ile Gln Glu Ile Asp Lys Tyr Arg Ile Pro Asp Arg Ile
625                 630                 635                 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Leu Ile Gly His Gly Lys Ala
                645                 650                 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser
```

660 665 670

Ser Glu Ile Glu Thr Ile Ile Asp Leu Ala Lys Ala Asp Ile Ser Pro
675 680 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser
690 695 700

Val Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Arg Val Lys
705 710 715 720

Asp Lys Val Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
725 730 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg
740 745 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
755 760 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
770 775 780

Asn Lys Ile Ile Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785 790 795 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu
805 810 815

Glu Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
820 825 830

Glu Thr Gln Val Val Glu Glu Arg Ile Glu Glu Ala Lys Ser Leu Thr
835 840 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser
850 855 860

Ile Ser Asp Ala Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Glu Glu

865 870 875 880

Ser His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe
885 890 895

Ser Ile Arg Phe Ile Asp Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
900 905 910

Thr Glu Lys Ala Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu
915 920 925

Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
930 935 940

Val Lys Lys Val Asn Leu Asp Ala Thr His Glu Val Asn Thr Leu Asn
945 950 955 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu
965 970 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
980 985 990

Leu Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp Ala Ala Lys Val Val
995 1000 1005

Glu Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu Pro
1010 1015 1020

Thr Leu Ser Glu Gly Leu Pro Val Ile Ala Thr Ile Ile Asp Gly
1025 1030 1035

Val Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp
1040 1045 1050

Pro Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala
1055 1060 1065

Val Asn Leu Thr Ala Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu

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1070 1075 1080

Gly Ile Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly
1085 1090 1095

Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile Leu
1100 1105 1110

Arg Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Ser His Ile Ser
1115 1120 1125

Leu Ala Glu Ser Glu Gly Ala Phe Thr Ser Leu Asp Asp Lys Ile
1130 1135 1140

Met Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn
1145 1150 1155

Asn Asn Ser Ile Thr Leu Gly Lys Cys Glu Ile Trp Arg Met Glu
1160 1165 1170

Gly Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe
1175 1180 1185

Ser Ser Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr
1190 1195 1200

Asp Val Leu Glu Val Lys Lys Glu Glu Leu Asp Leu Ser Lys Asp
1205 1210 1215

Leu Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Gly Trp Glu
1220 1225 1230

Thr Gly Trp Thr Pro Gly Leu Arg Gly Leu Glu Asn Asp Gly Thr
1235 1240 1245

Lys Leu Leu Asp Arg Ile Arg Asp Gln Tyr Glu Gly Gln Phe Tyr
1250 1255 1260

Trp Arg Phe Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu

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1265 1270 1275

Lys Pro Arg Tyr Glu Asp Thr Asn Val Arg Ile Ser Leu Asp Ser
1280 1285 1290

Asn Thr Arg Ser Phe Ile Val Pro Val Ile Thr Thr Glu Tyr Ile
1295 1300 1305

Arg Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr
1310 1315 1320

Ala Leu Ser Leu Ser Gln Tyr Asn Met Asn Ile Asn Ile Glu Leu
1325 1330 1335

Asn Glu Asn Asp Thr Trp Val Ile Asp Val Asp Asn Val Val Arg
1340 1345 1350

Ser Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile
1355 1360 1365

Glu Asn Ile Leu Ser Lys Leu Ser Ile Glu Asp Asn Lys Ile Ile
1370 1375 1380

Leu Asp Asn His Glu Ile Asn Phe Ser Gly Thr Leu Asn Gly Gly
1385 1390 1395

Asn Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn
1400 1405 1410

Ala Val Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Val Leu
1415 1420 1425

Ile Ser Gly Glu Leu Lys Thr Leu Met Ala Asn Ser Asn Ser Val
1430 1435 1440

Gln Gln Lys Ile Asp Tyr Ile Gly Leu Asn Ser Glu Leu Gln Lys
1445 1450 1455

Asn Ile Pro Tyr Ser Phe Met Asp Asp Lys Gly Lys Glu Asn Gly

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1460 1465 1470

Phe Ile Asn Cys Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu
1475 1480 1485

Ser Asp Val Val Leu Ile Ile Lys Val Tyr Met Asp Asn Ser Lys
1490 1495 1500

Pro Pro Phe Gly Tyr Tyr Ser Asn Asp Leu Lys Asp Val Lys Ala
1505 1510 1515

Ile Thr Lys Asp Asp Val Ile Ile Leu Thr Gly Tyr Tyr Leu Lys
1520 1525 1530

Asp Asp Ile Lys Ile Ser Leu Ser Phe Thr Ile Gln Asp Lys Asn
1535 1540 1545

Thr Ile Lys Leu Asn Gly Val Tyr Leu Asp Glu Asn Gly Val Ala
1550 1555 1560

Glu Ile Leu Lys Phe Met Asn Lys Lys Gly Ser Thr Asn Thr Ser
1565 1570 1575

Asp Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile
1580 1585 1590

Phe Ile Lys Ser Leu Lys Ser Asn Ala Lys Leu Ile Leu Asp Thr
1595 1600 1605

Asn Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe
1610 1615 1620

Ile Cys Asp Lys Asp Asn Asn Ile Gln Pro Tyr Phe Ile Lys Phe
1625 1630 1635

Asn Thr Leu Glu Thr Lys Tyr Thr Leu Tyr Val Gly Asn Arg Gln
1640 1645 1650

Asn Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp

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1655 1660 1665

Ile Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly
1670 1675 1680

Ile Asp Ser Cys Val Asn Lys Val Ile Ile Ser Pro Asn Ile Tyr
1685 1690 1695

Thr Asp Glu Ile Asn Ile Thr Pro Ile Tyr Glu Ala Asn Asn Thr
1700 1705 1710

Tyr Pro Glu Val Ile Val Leu Asp Thr Asn Tyr Ile Ser Glu Lys
1715 1720 1725

Ile Asn Ile Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser
1730 1735 1740

Asn Asp Gly Ser Asp Phe Ile Leu Met Ser Thr Asp Glu Glu Asn
1745 1750 1755

Lys Val Ser Gln Val Lys Ile Arg Phe Thr Asn Val Phe Lys Gly
1760 1765 1770

Asn Thr Ile Ser Asp Lys Ile Ser Phe Asn Phe Ser Asp Lys Gln
1775 1780 1785

Asp Val Ser Ile Asn Lys Ile Ile Ser Thr Phe Thr Pro Ser Tyr
1790 1795 1800

Tyr Val Glu Gly Leu Leu Asn Tyr His Leu Gly Leu Ile Ser Leu
1805 1810 1815

Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser
1820 1825 1830

Gly Leu Val Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro
1835 1840 1845

Ile Lys Asn Leu Ile Thr Gly Phe Thr Thr Ile Gly Asp Asp Lys

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1850 1855 1860

Tyr Tyr Phe Asn Pro Asp Asn Gly Gly Ala Ala Ser Val Gly Glu
1865 1870 1875

Thr Ile Ile Asp Gly Lys Asn Tyr Tyr Phe Ser Pro Asn Gly Val
1880 1885 1890

Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
1895 1900 1905

Ala Pro Ala Asp Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile
1910 1915 1920

Asp Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Val Tyr Tyr Phe
1925 1930 1935

Gly Asp Asn Tyr Arg Ala Ala Ile Glu Trp Gln Thr Leu Asp Asp
1940 1945 1950

Glu Val Tyr Tyr Phe Ser Thr Asp Thr Gly Arg Ala Phe Lys Gly
1955 1960 1965

Leu Asn Gln Ile Gly Asp Asp Lys Phe Tyr Phe Asn Ser Asp Gly
1970 1975 1980

Ile Met Gln Lys Gly Phe Val Asn Ile Asn Asp Lys Thr Phe Tyr
1985 1990 1995

Phe Asp Asp Ser Gly Val Met Lys Ser Gly Tyr Thr Glu Ile Asp
2000 2005 2010

Gly Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly
2015 2020 2025

Val Phe Asn Thr Ala Asp Gly Phe Lys Tyr Phe Ala His His Asp
2030 2035 2040

Glu Asp Leu Gly Asn Glu Glu Gly Glu Ala Leu Ser Tyr Ser Gly

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2045 2050 2055

Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe
2060 2065 2070

Thr Ala Val Val Gly Trp Lys Asp Ser Glu Asp Gly Ser Lys Tyr
2075 2080 2085

Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Ile Ser Thr
2090 2095 2100

Ile Asn Asp Gly Lys Tyr Tyr Phe Asn Asp Ser Gly Ile Met Gln
2105 2110 2115

Ile Gly Phe Val Thr Ile Asn Asn Glu Val Phe Tyr Phe Ser Asp
2120 2125 2130

Ser Gly Ile Val Glu Ser Gly Met Gln Asn Ile Asp Asp Asn Tyr
2135 2140 2145

Phe Tyr Ile Asp Glu Asn Gly Leu Val Gln Ile Gly Val Phe Asp
2150 2155 2160

Thr Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn
2165 2170 2175

Asp Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg
2180 2185 2190

Val Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu
2195 2200 2205

Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr
2210 2215 2220

Phe Asp Pro Glu Thr Lys Lys Ala Tyr Lys Gly Ile Asn Val Ile
2225 2230 2235

Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Asn Gly Ile Met Arg Thr

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2240 2245 2250

Gly Leu Ile Thr Phe Glu Asp Asn His Tyr Tyr Phe Asn Glu Asp
2255 2260 2265

Gly Ile Met Gln Tyr Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe
2270 2275 2280

Tyr Phe Asn Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr
2285 2290 2295

Ala Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu
2300 2305 2310

Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu
2315 2320 2325

Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Ile
2330 2335 2340

Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp
2345 2350 2355

Thr Ala Glu Leu Val Ile Ser Glu
2360 2365

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<211> 2366
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 341

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Val Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

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```
Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Thr Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Ile Leu Glu Leu Lys Asn Ser Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Ile Ala Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Ile Glu Ser Ala Ser Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Glu Phe Asn His Thr Ala Phe Phe Arg Lys Arg Met Gln
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Gln Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Lys Glu Glu Asn Pro Asp Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Asp Ile Asp Glu Leu Asn Ala Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Val Thr Glu Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240
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Asn Phe Glu Glu Phe Lys Thr Gly Glu Val Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Gly Ala Ser Asp Ile Leu Arg
            260                 265                 270

Val Ala Ile Leu Lys Asn Ile Gly Gly Val Tyr Leu Asp Val Ala Met
        275                 280                 285

Leu Pro Gly Ile His Pro Asp Leu Phe Lys Asp Ile Asn Lys Pro Asp
    290                 295                 300

Ser Val Lys Thr Ala Val Asp Trp Glu Glu Met Gln Leu Glu Ala Ile
305                 310                 315                 320

Met Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Lys His Phe Asp
                325                 330                 335

Thr Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
            340                 345                 350

Lys Ser Asp Lys Ser Glu Ile Phe Leu Pro Leu Gly Asp Ile Glu Val
        355                 360                 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Ala Lys Gly Ser Ile Ile Asn
    370                 375                 380

Gln Ala Leu Ile Ser Ala Lys Asp Ser Tyr Cys Ser Asp Leu Leu Ile
385                 390                 395                 400

Lys Gln Ile Gln Asn Arg Tyr Lys Ile Leu Asn Asp Thr Leu Gly Pro
                405                 410                 415

Ile Ile Ser Gln Gly Asn Asp Phe Asn Thr Thr Met Asn Asn Phe Gly
            420                 425                 430

Glu Ser Leu Gly Ala Ile Ala Asn Glu Glu Asn Ile Ser Phe Ile Ala
        435                 440                 445
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Lys Ile Gly Ser Tyr Leu Arg Val Gly Phe Tyr Pro Glu Ala Asn Thr
450 455 460

Thr Ile Thr Leu Ser Gly Pro Thr Ile Tyr Ala Gly Ala Tyr Lys Asp
465 470 475 480

Leu Leu Thr Phe Lys Glu Met Ser Ile Asp Thr Ser Ile Leu Ser Ser
485 490 495

Glu Leu Arg Asn Phe Glu Phe Pro Lys Val Asn Ile Ser Gln Ala Thr
500 505 510

Glu Gln Gln Lys Asn Ser Leu Ala Gln Phe Asn Glu Glu Arg Ala Lys
515 520 525

Ile Gln Phe Glu Glu Tyr Lys Lys Asn Tyr Phe Glu Gly Ala Leu Gly
530 535 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Thr Val Ile Asp Lys Glu
545 550 555 560

Tyr Leu Leu Glu Lys Ile Ser Ser Ser Thr Lys Ser Ser Glu Arg Gly
565 570 575

Tyr Val His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
580 585 590

Ala Ala Cys Asn Leu Phe Ala Lys Asn Pro Tyr Asp Ser Ile Leu Phe
595 600 605

Gln Lys Asn Ile Glu Asp Ser Glu Val Ala Tyr Tyr Tyr Asn Pro Thr
610 615 620

Asp Ser Glu Ile Gln Glu Ile Asp Lys Tyr Arg Ile Pro Asp Arg Ile
625 630 635 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Leu Ile Gly His Gly Lys Ala
645 650 655

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```
Glu Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser
            660                 665                 670

Ser Glu Ile Glu Thr Ile Ile Asp Leu Ala Lys Ala Asp Ile Ser Pro
        675                 680                 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser
    690                 695                 700

Val Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Arg Val Lys
705                 710                 715                 720

Asp Lys Val Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
                725                 730                 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg
            740                 745                 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
        755                 760                 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
    770                 775                 780

Asn Lys Ile Ile Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785                 790                 795                 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu
                805                 810                 815

Glu Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
            820                 825                 830

Glu Thr Gln Val Val Glu Glu Arg Ile Glu Glu Ala Lys Ser Leu Thr
        835                 840                 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser
    850                 855                 860
```

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```
Ile Ser Asp Ala Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Glu Glu
865                 870                 875                 880

Ser His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe
                885                 890                 895

Ser Ile Arg Phe Ile Asp Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
            900                 905                 910

Thr Glu Lys Ala Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu
        915                 920                 925

Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
    930                 935                 940

Val Lys Lys Val Asn Leu Asp Ala Thr His Glu Val Asn Thr Leu Asn
945                 950                 955                 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu
                965                 970                 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
            980                 985                 990

Leu Phe Ser Thr Gly Leu Asn Thr  Ile Thr Asp Ala Ala  Lys Val Val
        995                 1000                1005

Glu Leu  Val Ser Thr Ala Leu  Asp Glu Thr Ile Asp  Leu Leu Pro
    1010                1015                1020

Thr Leu  Ser Glu Gly Leu Pro  Val Ile Ala Thr Ile  Ile Asp Gly
    1025                1030                1035

Val Ser  Leu Gly Ala Ala Ile  Lys Glu Leu Ser Glu  Thr Ser Asp
    1040                1045                1050

Pro Leu  Leu Arg Gln Glu Ile  Glu Ala Lys Ile Gly  Ile Met Ala
    1055                1060                1065
```

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Val Asn Leu Thr Ala Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu
1070 1075 1080

Gly Ile Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly
1085 1090 1095

Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile Leu
1100 1105 1110

Arg Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Ser His Ile Ser
1115 1120 1125

Leu Ala Glu Ser Glu Gly Ala Phe Thr Ser Leu Asp Asp Lys Ile
1130 1135 1140

Met Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn
1145 1150 1155

Asn Asn Ser Ile Thr Leu Gly Lys Cys Glu Ile Trp Arg Met Glu
1160 1165 1170

Gly Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe
1175 1180 1185

Ser Ser Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr
1190 1195 1200

Asp Val Leu Glu Val Lys Lys Glu Glu Leu Asp Leu Ser Lys Asp
1205 1210 1215

Leu Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Gly Trp Glu
1220 1225 1230

Thr Gly Trp Thr Pro Gly Leu Arg Gly Leu Glu Asn Asp Gly Thr
1235 1240 1245

Lys Leu Leu Asp Arg Ile Arg Asp Gln Tyr Glu Gly Gln Phe Tyr
1250 1255 1260

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Trp Arg Phe Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu
1265 1270 1275

Lys Pro Arg Tyr Glu Asp Thr Asn Val Arg Ile Ser Leu Asp Ser
1280 1285 1290

Asn Thr Arg Ser Phe Ile Val Pro Val Ile Thr Thr Glu Tyr Ile
1295 1300 1305

Arg Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr
1310 1315 1320

Ala Leu Ser Leu Ser Gln Tyr Asn Met Asn Ile Asn Ile Glu Leu
1325 1330 1335

Asn Glu Asn Asp Thr Trp Val Ile Asp Val Asp Asn Val Val Arg
1340 1345 1350

Ser Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile
1355 1360 1365

Glu Asn Ile Leu Ser Lys Leu Ser Ile Glu Asp Asn Lys Ile Ile
1370 1375 1380

Leu Asp Asn His Glu Ile Asn Phe Ser Gly Thr Leu Asn Gly Gly
1385 1390 1395

Asn Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn
1400 1405 1410

Ala Val Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Val Leu
1415 1420 1425

Ile Ser Gly Glu Leu Lys Thr Leu Met Ala Asn Ser Asn Ser Val
1430 1435 1440

Gln Gln Lys Ile Asp Tyr Ile Gly Leu Asn Ser Glu Leu Gln Lys
1445 1450 1455

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```
Asn Ile  Pro Tyr Ser Phe Met  Asp Asp Lys Gly Lys  Glu Asn Gly
    1460                1465                1470

Phe Ile  Asn Cys Ser Thr Lys  Glu Gly Leu Phe Val  Ser Glu Leu
    1475                1480                1485

Ser Asp  Val Val Leu Ile Ile  Lys Val Tyr Met Asp  Asn Ser Lys
    1490                1495                1500

Pro Pro  Phe Gly Tyr Tyr Ser  Asn Asp Leu Lys Asp  Val Lys Ala
    1505                1510                1515

Ile Thr  Lys Asp Asp Val Ile  Ile Leu Thr Gly Tyr  Tyr Leu Lys
    1520                1525                1530

Asp Asp  Ile Lys Ile Ser Leu  Ser Phe Thr Ile Gln  Asp Lys Asn
    1535                1540                1545

Thr Ile  Lys Leu Asn Gly Val  Tyr Leu Asp Glu Asn  Gly Val Ala
    1550                1555                1560

Glu Ile  Leu Lys Phe Met Asn  Lys Lys Gly Ser Thr  Asn Thr Ser
    1565                1570                1575

Asp Ser  Leu Met Ser Phe Leu  Glu Ser Met Asn Ile  Lys Ser Ile
    1580                1585                1590

Phe Ile  Lys Ser Leu Lys Ser  Asn Ala Lys Leu Ile  Leu Asp Thr
    1595                1600                1605

Asn Phe  Ile Ile Ser Gly Thr  Thr Ser Ile Gly Gln  Phe Glu Phe
    1610                1615                1620

Ile Cys  Asp Lys Asp Asn Asn  Ile Gln Pro Tyr Phe  Ile Lys Phe
    1625                1630                1635

Asn Thr  Leu Glu Thr Lys Tyr  Thr Leu Tyr Val Gly  Asn Arg Gln
    1640                1645                1650
```

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```
Asn Met  Ile Val Glu Pro Asn  Tyr Asp Leu Asp Asp  Ser Gly Asp
    1655                 1660                 1665

Ile Ser  Ser Thr Val Ile Asn  Phe Ser Gln Lys Tyr  Leu Tyr Gly
    1670                 1675                 1680

Ile Asp  Ser Cys Val Asn Lys  Val Ile Ile Ser Pro  Asn Ile Tyr
    1685                 1690                 1695

Thr Asp  Glu Ile Asn Ile Thr  Pro Ile Tyr Glu Ala  Asn Asn Thr
    1700                 1705                 1710

Tyr Pro  Glu Val Ile Val Leu  Asp Thr Asn Tyr Ile  Ser Glu Lys
    1715                 1720                 1725

Ile Asn  Ile Asn Ile Asn Asp  Leu Ser Ile Arg Tyr  Val Trp Ser
    1730                 1735                 1740

Asn Asp  Gly Ser Asp Phe Ile  Leu Met Ser Thr Asp  Glu Glu Asn
    1745                 1750                 1755

Lys Val  Ser Gln Val Lys Ile  Arg Phe Thr Asn Val  Phe Lys Gly
    1760                 1765                 1770

Asn Thr  Ile Ser Asp Lys Ile  Ser Phe Asn Phe Ser  Asp Lys Gln
    1775                 1780                 1785

Asp Val  Ser Ile Asn Lys Ile  Ile Ser Thr Phe Thr  Pro Ser Tyr
    1790                 1795                 1800

Tyr Val  Glu Gly Leu Leu Asn  Tyr His Leu Gly Leu  Ile Ser Leu
    1805                 1810                 1815

Tyr Asn  Glu Lys Phe Tyr Ile  Asn Asn Phe Gly Met  Met Val Ser
    1820                 1825                 1830

Gly Leu  Val Tyr Ile Asn Asp  Ser Leu Tyr Tyr Phe  Lys Pro Pro
    1835                 1840                 1845
```

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Ile Lys Asn Leu Ile Thr Gly Phe Thr Thr Ile Gly Asp Asp Lys
1850 1855 1860

Tyr Tyr Phe Asn Pro Asp Asn Gly Gly Ala Ala Ser Val Gly Glu
1865 1870 1875

Thr Ile Ile Asp Gly Lys Asn Tyr Tyr Phe Ser Pro Asn Gly Val
1880 1885 1890

Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
1895 1900 1905

Ala Pro Ala Asp Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile
1910 1915 1920

Asp Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Val Tyr Tyr Phe
1925 1930 1935

Gly Asp Asn Tyr Arg Ala Ala Ile Glu Trp Gln Thr Leu Asp Asp
1940 1945 1950

Glu Val Tyr Tyr Phe Ser Thr Asp Thr Gly Arg Ala Phe Lys Gly
1955 1960 1965

Leu Asn Gln Ile Gly Asp Asp Lys Phe Tyr Phe Asn Ser Asp Gly
1970 1975 1980

Ile Met Gln Lys Gly Phe Val Asn Ile Asn Asp Lys Thr Phe Tyr
1985 1990 1995

Phe Asp Asp Ser Gly Val Met Lys Ser Gly Tyr Thr Glu Ile Asp
2000 2005 2010

Gly Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly
2015 2020 2025

Val Phe Asn Thr Ala Asp Gly Phe Lys Tyr Phe Ala His His Asp
2030 2035 2040

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```
Glu Asp  Leu Gly Asn Glu Glu  Gly Glu Ala Leu Ser  Tyr Ser Gly
    2045                2050                2055

Ile Leu  Asn Phe Asn Asn Lys  Ile Tyr Tyr Phe Asp  Asp Ser Phe
    2060                2065                2070

Thr Ala  Val Val Gly Trp Lys  Asp Ser Glu Asp Gly  Ser Lys Tyr
    2075                2080                2085

Tyr Phe  Asp Glu Asp Thr Ala  Glu Ala Tyr Ile Gly  Ile Ser Thr
    2090                2095                2100

Ile Asn  Asp Gly Lys Tyr Tyr  Phe Asn Asp Ser Gly  Ile Met Gln
    2105                2110                2115

Ile Gly  Phe Val Thr Ile Asn  Asn Glu Val Phe Tyr  Phe Ser Asp
    2120                2125                2130

Ser Gly  Ile Val Glu Ser Gly  Met Gln Asn Ile Asp  Asp Asn Tyr
    2135                2140                2145

Phe Tyr  Ile Asp Glu Asn Gly  Leu Val Gln Ile Gly  Val Phe Asp
    2150                2155                2160

Thr Ser  Asp Gly Tyr Lys Tyr  Phe Ala Pro Ala Asn  Thr Val Asn
    2165                2170                2175

Asp Asn  Ile Tyr Gly Gln Ala  Val Glu Tyr Ser Gly  Leu Val Arg
    2180                2185                2190

Val Gly  Glu Asp Val Tyr Tyr  Phe Gly Glu Thr Tyr  Thr Ile Glu
    2195                2200                2205

Thr Gly  Trp Ile Tyr Asp Met  Glu Asn Glu Ser Asp  Lys Tyr Tyr
    2210                2215                2220

Phe Asp  Pro Glu Thr Lys Lys  Ala Tyr Lys Gly Ile  Asn Val Ile
    2225                2230                2235
```

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Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Asn Gly Ile Met Arg Thr
2240 2245 2250

Gly Leu Ile Thr Phe Glu Asp Asn His Tyr Tyr Phe Asn Glu Asp
2255 2260 2265

Gly Ile Met Gln Tyr Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe
2270 2275 2280

Tyr Phe Asn Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr
2285 2290 2295

Ala Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu
2300 2305 2310

Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu
2315 2320 2325

Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Ile
2330 2335 2340

Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp
2345 2350 2355

Thr Ala Glu Leu Val Ile Ser Glu
2360 2365

<210> 342
<211> 2366
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 342

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Val Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu

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            20                  25                  30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Thr Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Ile Leu Glu Leu Lys Asn Ser Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Ile Ala Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Ile Glu Ser Ala Ser Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Glu Phe Asn His Thr Ala Phe Phe Arg Lys Arg Met Gln
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Gln Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Lys Glu Glu Asn Pro Asp Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Asp Ile Asp Glu Leu Asn Ala Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Val Thr Glu Asn Ser Gly Asn Asp Val Arg
```

225 230 235 240

Asn Phe Glu Glu Phe Lys Thr Gly Glu Val Phe Asn Leu Tyr Glu Gln
245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Gly Ala Ser Asp Ile Leu Arg
260 265 270

Val Ala Ile Leu Lys Asn Ile Gly Gly Val Tyr Leu Asp Val Ala Met
275 280 285

Leu Pro Gly Ile His Pro Asp Leu Phe Lys Asp Ile Asn Lys Pro Asp
290 295 300

Ser Val Lys Thr Ala Val Asp Trp Glu Glu Met Gln Leu Glu Ala Ile
305 310 315 320

Met Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Lys His Phe Asp
325 330 335

Thr Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
340 345 350

Lys Ser Asp Lys Ser Glu Ile Phe Leu Pro Leu Gly Asp Ile Glu Val
355 360 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Ala Lys Gly Ser Ile Ile Asn
370 375 380

Gln Ala Leu Ile Ser Ala Lys Asp Ser Tyr Cys Ser Asp Leu Leu Ile
385 390 395 400

Lys Gln Ile Gln Asn Arg Tyr Lys Ile Leu Asn Asp Thr Leu Gly Pro
405 410 415

Ile Ile Ser Gln Gly Asn Asp Phe Asn Thr Thr Met Asn Asn Phe Gly
420 425 430

Glu Ser Leu Gly Ala Ile Ala Asn Glu Glu Asn Ile Ser Phe Ile Ala

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435 440 445

Lys Ile Gly Ser Tyr Leu Arg Val Gly Phe Tyr Pro Glu Ala Asn Thr
450 455 460

Thr Ile Thr Leu Ser Gly Pro Thr Ile Tyr Ala Gly Ala Tyr Lys Asp
465 470 475 480

Leu Leu Thr Phe Lys Glu Met Ser Ile Asp Thr Ser Ile Leu Ser Ser
485 490 495

Glu Leu Arg Asn Phe Glu Phe Pro Lys Val Asn Ile Ser Gln Ala Thr
500 505 510

Glu Gln Gln Lys Asn Ser Leu Ala Gln Phe Asn Glu Glu Arg Ala Lys
515 520 525

Ile Gln Phe Glu Glu Tyr Lys Lys Asn Tyr Phe Glu Gly Ala Leu Gly
530 535 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Thr Val Ile Asp Lys Glu
545 550 555 560

Tyr Leu Leu Glu Lys Ile Ser Ser Ser Thr Lys Ser Ser Glu Arg Gly
565 570 575

Tyr Val His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
580 585 590

Ala Ala Cys Asn Leu Phe Ala Lys Asn Pro Tyr Asp Ser Ile Leu Phe
595 600 605

Gln Lys Asn Ile Glu Asp Ser Glu Val Ala Tyr Tyr Tyr Asn Pro Thr
610 615 620

Asp Ser Glu Ile Gln Glu Ile Asp Lys Tyr Arg Ile Pro Asp Arg Ile
625 630 635 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Leu Ile Gly His Gly Lys Ala

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645 650 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser
660 665 670

Ser Glu Ile Glu Thr Ile Ile Asp Leu Ala Lys Ala Asp Ile Ser Pro
675 680 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser
690 695 700

Val Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Arg Val Lys
705 710 715 720

Asp Lys Val Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
725 730 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg
740 745 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
755 760 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
770 775 780

Asn Lys Ile Ile Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785 790 795 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu
805 810 815

Glu Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
820 825 830

Glu Thr Gln Val Val Glu Glu Arg Ile Glu Glu Ala Lys Ser Leu Thr
835 840 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser

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```
    850                 855                 860

Ile Ser Asp Ala Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Glu Glu
865                 870                 875                 880

Ser His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe
                885                 890                 895

Ser Ile Arg Phe Ile Asp Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
            900                 905                 910

Thr Glu Lys Ala Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu
        915                 920                 925

Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
    930                 935                 940

Val Lys Lys Val Asn Leu Asp Ala Thr His Glu Val Asn Thr Leu Asn
945                 950                 955                 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu
                965                 970                 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
            980                 985                 990

Leu Phe Ser Thr Gly Leu Asn Thr  Ile Thr Asp Ala Ala  Lys Val Val
        995                 1000                1005

Glu Leu  Val Ser Thr Ala Leu  Asp Glu Thr Ile Asp  Leu Leu Pro
    1010                1015                1020

Thr Leu  Ser Glu Gly Leu Pro  Val Ile Ala Thr Ile  Ile Asp Gly
    1025                1030                1035

Val Ser  Leu Gly Ala Ala Ile  Lys Glu Leu Ser Glu  Thr Ser Asp
    1040                1045                1050

Pro Leu  Leu Arg Gln Glu Ile  Glu Ala Lys Ile Gly  Ile Met Ala
```

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1055 1060 1065

Val Asn Leu Thr Ala Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu
1070 1075 1080

Gly Ile Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly
1085 1090 1095

Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile Leu
1100 1105 1110

Arg Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Ser His Ile Ser
1115 1120 1125

Leu Ala Glu Ser Glu Gly Ala Phe Thr Ser Leu Asp Asp Lys Ile
1130 1135 1140

Met Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn
1145 1150 1155

Asn Asn Ser Ile Thr Leu Gly Lys Cys Glu Ile Trp Arg Met Glu
1160 1165 1170

Gly Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe
1175 1180 1185

Ser Ser Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr
1190 1195 1200

Asp Val Leu Glu Val Lys Lys Glu Glu Leu Asp Leu Ser Lys Asp
1205 1210 1215

Leu Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Gly Trp Glu
1220 1225 1230

Thr Gly Trp Thr Pro Gly Leu Arg Gly Leu Glu Asn Asp Gly Thr
1235 1240 1245

Lys Leu Leu Asp Arg Ile Arg Asp Gln Tyr Glu Gly Gln Phe Tyr

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1250 1255 1260

Trp Arg Phe Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu
1265 1270 1275

Lys Pro Arg Tyr Glu Asp Thr Asn Val Arg Ile Ser Leu Asp Ser
1280 1285 1290

Asn Thr Arg Ser Phe Ile Val Pro Val Ile Thr Thr Glu Tyr Ile
1295 1300 1305

Arg Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr
1310 1315 1320

Ala Leu Ser Leu Ser Gln Tyr Asn Met Asn Ile Asn Ile Glu Leu
1325 1330 1335

Asn Glu Asn Asp Thr Trp Val Ile Asp Val Asp Asn Val Val Arg
1340 1345 1350

Ser Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile
1355 1360 1365

Glu Asn Ile Leu Ser Lys Leu Ser Ile Glu Asp Asn Lys Ile Ile
1370 1375 1380

Leu Asp Asn His Glu Ile Asn Phe Ser Gly Thr Leu Asn Gly Gly
1385 1390 1395

Asn Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn
1400 1405 1410

Ala Val Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Val Leu
1415 1420 1425

Ile Ser Gly Glu Leu Lys Thr Leu Met Ala Asn Ser Asn Ser Val
1430 1435 1440

Gln Gln Lys Ile Asp Tyr Ile Gly Leu Asn Ser Glu Leu Gln Lys

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1445 1450 1455

Asn Ile Pro Tyr Ser Phe Met Asp Asp Lys Gly Lys Glu Asn Gly
1460 1465 1470

Phe Ile Asn Cys Ser Thr Lys Asp Gly Leu Phe Val Ser Glu Leu
1475 1480 1485

Ser Asp Val Val Leu Ile Ile Lys Val Tyr Met Asp Asn Ser Lys
1490 1495 1500

Pro Pro Phe Gly Tyr Tyr Ser Asn Asp Leu Lys Asp Val Lys Ala
1505 1510 1515

Ile Thr Lys Asp Asp Val Ile Ile Leu Thr Gly Tyr Tyr Leu Lys
1520 1525 1530

Asp Asp Ile Lys Ile Ser Leu Ser Phe Thr Ile Gln Asp Lys Asn
1535 1540 1545

Thr Ile Lys Leu Asn Gly Val Tyr Leu Asp Glu Asn Gly Val Ala
1550 1555 1560

Glu Ile Leu Lys Phe Met Asn Lys Lys Gly Ser Thr Asn Thr Ser
1565 1570 1575

Asp Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile
1580 1585 1590

Phe Ile Lys Ser Leu Lys Ser Asn Ala Lys Leu Ile Leu Asp Thr
1595 1600 1605

Asn Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe
1610 1615 1620

Ile Cys Asp Lys Asp Asn Asn Ile Gln Pro Tyr Phe Ile Lys Phe
1625 1630 1635

Asn Thr Leu Glu Thr Lys Tyr Thr Leu Tyr Val Gly Asn Arg Gln

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1640 1645 1650

Asn Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp
1655 1660 1665

Ile Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly
1670 1675 1680

Ile Asp Ser Cys Val Asn Lys Val Ile Ile Ser Pro Asn Ile Tyr
1685 1690 1695

Thr Asp Glu Ile Asn Ile Thr Pro Ile Tyr Glu Ala Asn Asn Thr
1700 1705 1710

Tyr Pro Glu Val Ile Val Leu Asp Thr Asn Tyr Ile Ser Glu Lys
1715 1720 1725

Ile Asn Ile Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser
1730 1735 1740

Asn Asp Gly Ser Asp Phe Ile Leu Met Ser Thr Asp Glu Glu Asn
1745 1750 1755

Lys Val Ser Gln Val Lys Ile Arg Phe Thr Asn Val Phe Lys Gly
1760 1765 1770

Asn Thr Ile Ser Asp Lys Ile Ser Phe Asn Phe Ser Asp Lys Gln
1775 1780 1785

Asp Val Ser Ile Asn Lys Ile Ile Ser Thr Phe Thr Pro Ser Tyr
1790 1795 1800

Tyr Val Glu Gly Leu Leu Asn Tyr His Leu Gly Leu Ile Ser Leu
1805 1810 1815

Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser
1820 1825 1830

Gly Leu Val Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro

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1835 1840 1845

Ile Lys Asn Leu Ile Thr Gly Phe Thr Thr Ile Gly Asp Asp Lys
1850 1855 1860

Tyr Tyr Phe Asn Pro Asp Asn Gly Gly Ala Ala Ser Val Gly Glu
1865 1870 1875

Thr Ile Ile Asp Gly Lys Asn Tyr Tyr Phe Ser Pro Asn Gly Val
1880 1885 1890

Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
1895 1900 1905

Ala Pro Ala Asp Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile
1910 1915 1920

Asp Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Val Tyr Tyr Phe
1925 1930 1935

Gly Asp Asn Tyr Arg Ala Ala Ile Glu Trp Gln Thr Leu Asp Asp
1940 1945 1950

Glu Val Tyr Tyr Phe Ser Thr Asp Thr Gly Arg Ala Phe Lys Gly
1955 1960 1965

Leu Asn Gln Ile Gly Asp Asp Lys Phe Tyr Phe Asn Ser Asp Gly
1970 1975 1980

Ile Met Gln Lys Gly Phe Val Asn Ile Asn Asp Lys Thr Phe Tyr
1985 1990 1995

Phe Asp Asp Ser Gly Val Met Lys Ser Gly Tyr Thr Glu Ile Asp
2000 2005 2010

Gly Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly
2015 2020 2025

Val Phe Asn Thr Ala Asp Gly Phe Lys Tyr Phe Ala His His Asp

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2030 2035 2040

Glu Asp Leu Gly Asn Glu Glu Gly Glu Ala Leu Ser Tyr Ser Gly
2045 2050 2055

Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe
2060 2065 2070

Thr Ala Val Val Gly Trp Lys Asp Ser Glu Asp Gly Ser Lys Tyr
2075 2080 2085

Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Ile Ser Thr
2090 2095 2100

Ile Asn Asp Gly Lys Tyr Tyr Phe Asn Asp Ser Gly Ile Met Gln
2105 2110 2115

Ile Gly Phe Val Thr Ile Asn Asn Glu Val Phe Tyr Phe Ser Asp
2120 2125 2130

Ser Gly Ile Val Glu Ser Gly Met Gln Asn Ile Asp Asp Asn Tyr
2135 2140 2145

Phe Tyr Ile Asp Glu Asn Gly Leu Val Gln Ile Gly Val Phe Asp
2150 2155 2160

Thr Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn
2165 2170 2175

Asp Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg
2180 2185 2190

Val Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu
2195 2200 2205

Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr
2210 2215 2220

Phe Asp Pro Glu Thr Lys Lys Ala Tyr Lys Gly Ile Asn Val Ile

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2225 2230 2235

Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Asn Gly Ile Met Arg Thr
2240 2245 2250

Gly Leu Ile Thr Phe Glu Asp Asn His Tyr Tyr Phe Asn Glu Asp
2255 2260 2265

Gly Ile Met Gln Tyr Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe
2270 2275 2280

Tyr Phe Asn Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr
2285 2290 2295

Ala Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu
2300 2305 2310

Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu
2315 2320 2325

Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Ile
2330 2335 2340

Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp
2345 2350 2355

Thr Ala Glu Leu Val Ile Ser Glu
2360 2365

<210> 343
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 343

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

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```
Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
            20                  25                  30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Ala Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220
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```
Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430
```

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Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Gln Met Ala Ser Leu Ala Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
530 535 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545 550 555 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
565 570 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
580 585 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
595 600 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
610 615 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625 630 635 640

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Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
645 650 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
660 665 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
675 680 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
690 695 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705 710 715 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
725 730 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
740 745 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
755 760 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
770 775 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785 790 795 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
805 810 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
820 825 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
835 840 845

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```
Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
    850                 855                 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865                 870                 875                 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
                885                 890                 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
        915                 920                 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Ile  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050
```

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```
Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
    1055                1060                1065

Asn Leu  Thr Thr Ala Thr Thr  Ala Ile Ile Thr Ser  Ser Leu Gly
    1070                1075                1080

Val Ala  Ser Gly Phe Ser Ile  Leu Leu Val Pro Leu  Ala Gly Ile
    1085                1090                1095

Ser Ala  Gly Ile Pro Ser Leu  Val Asn Asn Glu Leu  Val Leu Arg
    1100                1105                1110

Asp Lys  Ala Thr Lys Val Val  Asp Tyr Phe Lys His  Val Ser Leu
    1115                1120                1125

Val Glu  Thr Glu Gly Val Phe  Thr Leu Leu Asp Asp  Lys Ile Met
    1130                1135                1140

Met Pro  Gln Asp Asp Leu Val  Ile Ser Glu Ile Asp  Phe Asn Asn
    1145                1150                1155

Asn Ser  Ile Val Leu Gly Lys  Cys Glu Ile Trp Arg  Met Glu Gly
    1160                1165                1170

Gly Ser  Gly His Thr Val Thr  Asp Asp Ile Asp His  Phe Phe Ser
    1175                1180                1185

Ala Pro  Ser Ile Thr Tyr Arg  Glu Pro His Leu Ser  Ile Tyr Asp
    1190                1195                1200

Val Leu  Glu Val Gln Lys Glu  Glu Leu Asp Leu Ser  Lys Asp Leu
    1205                1210                1215

Met Val  Leu Pro Asn Ala Pro  Asn Arg Val Phe Ala  Trp Glu Thr
    1220                1225                1230

Gly Trp  Thr Pro Gly Leu Arg  Ser Leu Glu Asn Asp  Gly Thr Lys
    1235                1240                1245
```

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```
Leu Leu  Asp Arg Ile Arg Asp  Asn Tyr Glu Gly Glu  Phe Tyr Trp
    1250                1255                1260

Arg Tyr  Phe Ala Phe Ile Ala  Asp Ala Leu Ile Thr  Thr Leu Lys
    1265                1270                1275

Pro Arg  Tyr Glu Asp Thr Asn  Ile Arg Ile Asn Leu  Asp Ser Asn
    1280                1285                1290

Thr Arg  Ser Phe Ile Val Pro  Ile Ile Thr Thr Glu  Tyr Ile Arg
    1295                1300                1305

Glu Lys  Leu Ser Tyr Ser Phe  Tyr Gly Ser Gly Gly  Thr Tyr Ala
    1310                1315                1320

Leu Ser  Leu Ser Gln Tyr Asn  Met Gly Ile Asn Ile  Glu Leu Ser
    1325                1330                1335

Glu Ser  Asp Val Trp Ile Ile  Asp Val Asp Asn Val  Val Arg Asp
    1340                1345                1350

Val Thr  Ile Glu Ser Asp Lys  Ile Lys Lys Gly Asp  Leu Ile Glu
    1355                1360                1365

Gly Ile  Leu Ser Thr Leu Ser  Ile Glu Glu Asn Lys  Ile Ile Leu
    1370                1375                1380

Asn Ser  His Glu Ile Asn Phe  Ser Gly Glu Val Asn  Gly Ser Asn
    1385                1390                1395

Gly Phe  Val Ser Leu Thr Phe  Ser Ile Leu Glu Gly  Ile Asn Ala
    1400                1405                1410

Ile Ile  Glu Val Asp Leu Leu  Ser Lys Ser Tyr Lys  Leu Leu Ile
    1415                1420                1425

Ser Gly  Glu Leu Lys Ile Leu  Met Leu Asn Ser Asn  His Ile Gln
    1430                1435                1440
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Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys Thr
1535 1540 1545

Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Arg Lys Gly Asn Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe
1580 1585 1590

Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

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Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

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Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Tyr Lys Tyr Tyr Phe Asn Ser Asp Gly Val
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

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Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

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Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

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<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 344

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Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Ala Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
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210 215 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225 230 235 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
260 265 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Ala Met
275 280 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
290 295 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp

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420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Gln Met Ala Ser Leu Ala Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
530 535 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545 550 555 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
565 570 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
580 585 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
595 600 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
610 615 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser

625 630 635 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
645 650 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
660 665 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
675 680 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
690 695 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705 710 715 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
725 730 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
740 745 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
755 760 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
770 775 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785 790 795 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
805 810 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
820 825 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser

835 840 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
850 855 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865 870 875 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
885 890 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
900 905 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
915 920 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
930 935 940

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945 950 955 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
965 970 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
980 985 990

Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp Ala Ala Lys Val Val Glu
995 1000 1005

Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu Pro Thr
1010 1015 1020

Leu Ser Glu Gly Leu Pro Ile Ile Ala Thr Ile Ile Asp Gly Val
1025 1030 1035

Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp Pro

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1040 1045 1050

Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala Val
1055 1060 1065

Asn Leu Thr Thr Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu Gly
1070 1075 1080

Ile Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile
1085 1090 1095

Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg
1100 1105 1110

Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Val Ser Leu
1115 1120 1125

Val Glu Thr Glu Gly Val Phe Thr Leu Leu Asp Asp Lys Ile Met
1130 1135 1140

Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr Lys

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1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile Leu
1370 1375 1380

Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln

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1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys Thr
1535 1540 1545

Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Arg Lys Gly Asn Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe
1580 1585 1590

Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn

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1625 1630 1635

Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly

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1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Val
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val

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2015 2020 2025

Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe

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2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

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<213> Artificial Sequence

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<223> Synthetic amino acid sequence

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Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
            20                  25                  30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Ala Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205
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```
Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415
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```
Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Gln Met Ala Ser Leu Ala Ser Phe Asp Asp Ala Arg Ala Lys Ala
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545                 550                 555                 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
            580                 585                 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
        595                 600                 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
    610                 615                 620
```

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Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625 630 635 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
645 650 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
660 665 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
675 680 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
690 695 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705 710 715 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
725 730 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
740 745 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
755 760 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
770 775 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785 790 795 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
805 810 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
820 825 830

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```
Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
        835                 840                 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
    850                 855                 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865                 870                 875                 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
                885                 890                 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
        915                 920                 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Ile  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035
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Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp Pro
1040 1045 1050

Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala Val
1055 1060 1065

Asn Leu Thr Thr Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu Gly
1070 1075 1080

Ile Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile
1085 1090 1095

Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg
1100 1105 1110

Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Val Ser Leu
1115 1120 1125

Val Glu Thr Glu Gly Val Phe Thr Leu Leu Asp Asp Lys Ile Met
1130 1135 1140

Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

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Gly Trp  Thr Pro Gly Leu Arg  Ser Leu Glu Asn Asp  Gly Thr Lys
    1235                1240                1245

Leu Leu  Asp Arg Ile Arg Asp  Asn Tyr Glu Gly Glu  Phe Tyr Trp
    1250                1255                1260

Arg Tyr  Phe Ala Phe Ile Ala  Asp Ala Leu Ile Thr  Thr Leu Lys
    1265                1270                1275

Pro Arg  Tyr Glu Asp Thr Asn  Ile Arg Ile Asn Leu  Asp Ser Asn
    1280                1285                1290

Thr Arg  Ser Phe Ile Val Pro  Ile Ile Thr Thr Glu  Tyr Ile Arg
    1295                1300                1305

Glu Lys  Leu Ser Tyr Ser Phe  Tyr Gly Ser Gly Gly  Thr Tyr Ala
    1310                1315                1320

Leu Ser  Leu Ser Gln Tyr Asn  Met Gly Ile Asn Ile  Glu Leu Ser
    1325                1330                1335

Glu Ser  Asp Val Trp Ile Ile  Asp Val Asp Asn Val  Val Arg Asp
    1340                1345                1350

Val Thr  Ile Glu Ser Asp Lys  Ile Lys Lys Gly Asp  Leu Ile Glu
    1355                1360                1365

Gly Ile  Leu Ser Thr Leu Ser  Ile Glu Glu Asn Lys  Ile Ile Leu
    1370                1375                1380

Asn Ser  His Glu Ile Asn Phe  Ser Gly Glu Val Asn  Gly Ser Asn
    1385                1390                1395

Gly Phe  Val Ser Leu Thr Phe  Ser Ile Leu Glu Gly  Ile Asn Ala
    1400                1405                1410

Ile Ile  Glu Val Asp Leu Leu  Ser Lys Ser Tyr Lys  Leu Leu Ile
    1415                1420                1425
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```
Ser Gly  Glu Leu Lys Ile Leu  Met Leu Asn Ser Asn  His Ile Gln
    1430                1435                1440

Gln Lys  Ile Asp Tyr Ile Gly  Phe Asn Ser Glu Leu  Gln Lys Asn
    1445                1450                1455

Ile Pro  Tyr Ser Phe Val Asp  Ser Glu Gly Lys Glu  Asn Gly Phe
    1460                1465                1470

Ile Asn  Gly Ser Thr Lys Glu  Gly Leu Phe Val Ser  Glu Leu Pro
    1475                1480                1485

Asp Val  Val Leu Ile Ser Lys  Val Tyr Met Asp Asp  Ser Lys Pro
    1490                1495                1500

Ser Phe  Gly Tyr Tyr Ser Asn  Asn Leu Lys Asp Val  Lys Val Ile
    1505                1510                1515

Thr Lys  Asp Asn Val Asn Ile  Leu Thr Gly Tyr Tyr  Leu Lys Asp
    1520                1525                1530

Asp Ile  Lys Ile Ser Leu Ser  Leu Thr Leu Gln Asp  Glu Lys Thr
    1535                1540                1545

Ile Lys  Leu Asn Ser Val His  Leu Asp Glu Ser Gly  Val Ala Glu
    1550                1555                1560

Ile Leu  Lys Phe Met Asn Arg  Lys Gly Asn Thr Asn  Thr Ser Asp
    1565                1570                1575

Ser Leu  Met Ser Phe Leu Glu  Ser Met Asn Ile Lys  Ser Ile Phe
    1580                1585                1590

Val Asn  Phe Leu Gln Ser Asn  Ile Lys Phe Ile Leu  Asp Ala Asn
    1595                1600                1605

Phe Ile  Ile Ser Gly Thr Thr  Ser Ile Gly Gln Phe  Glu Phe Ile
    1610                1615                1620
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Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

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Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Leu Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Val
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp Gly
2000 2005 2010

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Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

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Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 346
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

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<400> 346

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Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1               5                  10                  15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
            20                  25                  30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Ala Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
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195 200 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
210 215 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225 230 235 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
260 265 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Ala Met
275 280 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
290 295 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala

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405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Gln Met Ala Ser Leu Ala Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
530 535 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545 550 555 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
565 570 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
580 585 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
595 600 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp

610 615 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625 630 635 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
645 650 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
660 665 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
675 680 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
690 695 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705 710 715 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
725 730 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
740 745 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
755 760 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
770 775 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785 790 795 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
805 810 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp

820 825 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
835 840 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
850 855 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865 870 875 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
885 890 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
900 905 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
915 920 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
930 935 940

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945 950 955 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
965 970 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
980 985 990

Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp Ala Ala Lys Val Val Glu
995 1000 1005

Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu Pro Thr
1010 1015 1020

Leu Ser Glu Gly Leu Pro Ile Ile Ala Thr Ile Ile Asp Gly Val

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1025 1030 1035

Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp Pro
1040 1045 1050

Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala Val
1055 1060 1065

Asn Leu Thr Thr Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu Gly
1070 1075 1080

Val Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile
1085 1090 1095

Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg
1100 1105 1110

Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Val Ser Leu
1115 1120 1125

Val Glu Thr Glu Gly Val Phe Thr Leu Leu Asp Asp Lys Ile Met
1130 1135 1140

Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr

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1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile Leu
1370 1375 1380

Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile

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1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys Thr
1535 1540 1545

Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Arg Lys Gly Asn Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe
1580 1585 1590

Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile

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1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr

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1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Tyr Lys Tyr Tyr Phe Asn Ser Asp Gly Val
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp Gly

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2000 2005 2010

Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr

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2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

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<211> 2365
<212> PRT
<213> Artificial Sequence

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<220>
<223> Synthetic amino acid sequence

<400> 347

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Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
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Arg Val Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
            20                  25                  30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Ala Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Val Glu Ser Ala Thr Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Tyr Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Thr Gln
            180                 185                 190
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```
Arg Glu Glu Asn Pro Asp Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Asp Ile Asp Glu Leu Asn Ser Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Val Thr Glu Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Gly Gly Glu Ser Phe Lys Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Val Gly Gly Val Tyr Leu Asp Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Val Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400
```

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```
Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Ala Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Gln Met Ala Ser Leu Ala Ser Phe Asp Asp Ala Arg Ala Lys Ala
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Lys Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Thr Val Val Asp Lys Glu Tyr
545                 550                 555                 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
            580                 585                 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
        595                 600                 605
```

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```
Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
    610                 615                 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625                 630                 635                 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
                645                 650                 655

Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser Thr
            660                 665                 670

Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
        675                 680                 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Val
    690                 695                 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Arg Val Lys Asp
705                 710                 715                 720

Lys Val Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
                725                 730                 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
            740                 745                 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
        755                 760                 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
    770                 775                 780

Lys Ile Ile Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785                 790                 795                 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
                805                 810                 815
```

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```
Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
            820                 825                 830

Thr Gln Val Val Glu Gly Arg Ile Glu Glu Ala Lys Ser Leu Thr Ser
        835                 840                 845

Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser Ile
    850                 855                 860

Ser Asp Ala Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Glu Glu Ser
865                 870                 875                 880

His Phe Ile Ser Phe Glu Asp Ile Leu Glu Thr Asp Glu Gly Phe Ser
                885                 890                 895

Ile Arg Phe Ile Asp Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Ala Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
        915                 920                 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Ala Thr His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020
```

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Leu Ser Glu Gly Leu Pro Val Ile Ala Thr Ile Ile Asp Gly Val
1025 1030 1035

Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp Pro
1040 1045 1050

Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala Val
1055 1060 1065

Asn Leu Thr Ala Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu Gly
1070 1075 1080

Ile Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile
1085 1090 1095

Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile Leu Arg
1100 1105 1110

Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Ser His Ile Ser Leu
1115 1120 1125

Ala Glu Ser Glu Gly Ala Phe Thr Ser Leu Asp Asp Lys Ile Met
1130 1135 1140

Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Thr Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

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Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Thr Arg Ser Phe Ile Val Pro Val Ile Thr Thr Glu Tyr Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Asn Ile Asn Ile Glu Leu Asn
1325 1330 1335

Glu Asn Asp Thr Trp Val Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Asn Ile Leu Ser Lys Leu Ser Ile Glu Asp Asn Lys Ile Ile Leu
1370 1375 1380

Asp Asn His Glu Ile Asn Phe Ser Gly Thr Leu Asn Gly Gly Asn
1385 1390 1395

Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

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Val Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Val Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Thr Leu Met Ala Asn Ser Asn Ser Val Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Leu Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Met Asp Asp Lys Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Cys Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Ser
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asn Ser Lys Pro
1490 1495 1500

Leu Phe Gly Tyr Cys Ser Asn Asp Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asp Val Ile Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Phe Thr Ile Gln Asp Glu Asn Thr
1535 1540 1545

Ile Lys Leu Asn Gly Val Tyr Leu Asp Glu Asn Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Lys Lys Gly Ser Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe
1580 1585 1590

Ile Asn Ser Leu Gln Ser Asn Thr Lys Leu Ile Leu Asp Thr Asn
1595 1600 1605

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```
Phe Ile  Ile Ser Gly Thr Thr  Ser Ile Gly Gln Phe  Glu Phe Ile
    1610                 1615                 1620

Cys Asp  Lys Asp Asn Asn Ile  Gln Pro Tyr Phe Ile  Lys Phe Asn
    1625                 1630                 1635

Thr Leu  Glu Thr Lys Tyr Thr  Leu Tyr Val Gly Asn  Arg Gln Asn
    1640                 1645                 1650

Met Ile  Val Glu Pro Asn Tyr  Asp Leu Asp Asp Ser  Gly Asp Ile
    1655                 1660                 1665

Ser Ser  Thr Val Ile Asn Phe  Ser Gln Lys Tyr Leu  Tyr Gly Ile
    1670                 1675                 1680

Asp Ser  Cys Val Asn Lys Val  Ile Ile Ser Pro Asn  Ile Tyr Thr
    1685                 1690                 1695

Asp Glu  Ile Asn Ile Thr Pro  Ile Tyr Glu Ala Asn  Asn Thr Tyr
    1700                 1705                 1710

Pro Glu  Val Ile Val Leu Asp  Thr Asn Tyr Ile Ser  Glu Lys Ile
    1715                 1720                 1725

Asn Ile  Asn Ile Asn Asp Leu  Ser Ile Arg Tyr Val  Trp Ser Asn
    1730                 1735                 1740

Asp Gly  Ser Asp Phe Ile Leu  Met Ser Thr Asp Glu  Glu Asn Lys
    1745                 1750                 1755

Val Ser  Gln Val Lys Ile Arg  Phe Thr Asn Val Phe  Lys Gly Asn
    1760                 1765                 1770

Thr Ile  Ser Asp Lys Ile Ser  Phe Asn Phe Ser Asp  Lys Gln Asp
    1775                 1780                 1785

Val Ser  Ile Asn Lys Val Ile  Ser Thr Phe Thr Pro  Ser Tyr Tyr
    1790                 1795                 1800
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Val Glu Gly Leu Leu Asn Tyr Asp Leu Gly Leu Ile Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Val Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Ile
1835 1840 1845

Lys Asn Leu Ile Thr Gly Phe Thr Thr Ile Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Asp Asn Gly Gly Ala Ala Ser Val Gly Glu Thr
1865 1870 1875

Ile Ile Asp Gly Lys Asn Tyr Tyr Phe Ser Gln Asn Gly Val Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asp Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Thr Ile Asp Glu Asn Val Tyr Tyr Phe Gly
1925 1930 1935

Asp Asn Tyr Arg Ala Ala Ile Glu Trp Gln Thr Leu Asp Asp Glu
1940 1945 1950

Val Tyr Tyr Phe Ser Thr Asp Thr Gly Arg Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Asp Lys Phe Tyr Phe Asn Ser Asp Gly Ile
1970 1975 1980

Met Gln Lys Gly Phe Val Asn Ile Asn Asp Lys Thr Phe Tyr Phe
1985 1990 1995

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Asp Asp Ser Gly Val Met Lys Ser Gly Tyr Thr Glu Ile Asp Gly
2000 2005 2010

Lys Tyr Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Ala Asp Gly Phe Lys Tyr Phe Ala His His Asp Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Ala Leu Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Ile Ser Ile Ile
2090 2095 2100

Asn Asp Gly Lys Tyr Tyr Phe Asn Asp Ser Gly Ile Met Gln Ile
2105 2110 2115

Gly Phe Val Thr Ile Asn Asn Glu Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Val Glu Ser Gly Met Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Glu Asn Gly Leu Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

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Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asp Pro Glu Thr Lys Lys Ala Tyr Lys Gly Ile Asn Val Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Asn Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Thr Phe Glu Asp Asn His Tyr Tyr Phe Asn Glu Asp Gly
2255 2260 2265

Ile Met Gln Tyr Gly Tyr Leu Asn Ile Glu Asp Lys Thr Phe Tyr
2270 2275 2280

Phe Ser Glu Asp Gly Ile Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 348
<211> 2365
<212> PRT

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<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 348

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Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1               5                  10                  15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
            20                  25                  30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Ala Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
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            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
```

385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Gln Met Ala Ser Leu Ala Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
530 535 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545 550 555 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
565 570 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
580 585 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln

595 600 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
610 615 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625 630 635 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
645 650 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
660 665 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
675 680 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
690 695 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705 710 715 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
725 730 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
740 745 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
755 760 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
770 775 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785 790 795 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu

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805 810 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
820 825 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
835 840 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
850 855 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865 870 875 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
885 890 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
900 905 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
915 920 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
930 935 940

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945 950 955 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
965 970 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
980 985 990

Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp Ala Ala Lys Val Val Glu
995 1000 1005

Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu Pro Thr

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1010 1015 1020

Leu Ser Glu Gly Leu Pro Ile Ile Ala Thr Ile Ile Asp Gly Val
1025 1030 1035

Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp Pro
1040 1045 1050

Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala Val
1055 1060 1065

Asn Leu Thr Thr Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu Gly
1070 1075 1080

Val Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile
1085 1090 1095

Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg
1100 1105 1110

Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Val Ser Leu
1115 1120 1125

Val Glu Thr Glu Gly Val Phe Thr Leu Leu Asp Asp Lys Ile Met
1130 1135 1140

Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu

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1205                1210                1215

Met Val  Leu Pro Asn Ala Pro  Asn Arg Val Phe Ala  Trp Glu Thr
    1220                1225                1230

Gly Trp  Thr Pro Gly Leu Arg  Ser Leu Glu Asn Asp  Gly Thr Lys
    1235                1240                1245

Leu Leu  Asp Arg Ile Arg Asp  Asn Tyr Glu Gly Glu  Phe Tyr Trp
    1250                1255                1260

Arg Tyr  Phe Ala Phe Ile Ala  Asp Ala Leu Ile Thr  Thr Leu Lys
    1265                1270                1275

Pro Arg  Tyr Glu Asp Thr Asn  Ile Arg Ile Asn Leu  Asp Ser Asn
    1280                1285                1290

Thr Arg  Ser Phe Ile Val Pro  Ile Ile Thr Thr Glu  Tyr Ile Arg
    1295                1300                1305

Glu Lys  Leu Ser Tyr Ser Phe  Tyr Gly Ser Gly Gly  Thr Tyr Ala
    1310                1315                1320

Leu Ser  Leu Ser Gln Tyr Asn  Met Gly Ile Asn Ile  Glu Leu Ser
    1325                1330                1335

Glu Ser  Asp Val Trp Ile Ile  Asp Val Asp Asn Val  Val Arg Asp
    1340                1345                1350

Val Thr  Ile Glu Ser Asp Lys  Ile Lys Lys Gly Asp  Leu Ile Glu
    1355                1360                1365

Gly Ile  Leu Ser Thr Leu Ser  Ile Glu Glu Asn Lys  Ile Ile Leu
    1370                1375                1380

Asn Ser  His Glu Ile Asn Phe  Ser Gly Glu Val Asn  Gly Ser Asn
    1385                1390                1395

Gly Phe  Val Ser Leu Thr Phe  Ser Ile Leu Glu Gly  Ile Asn Ala
```

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1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys Thr
1535 1540 1545

Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Arg Lys Gly Asn Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe
1580 1585 1590

Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala Asn

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1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr Tyr

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1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Tyr Lys Tyr Tyr Phe Asn Ser Asp Gly Val
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe

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1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val

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2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 349

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<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 349

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1               5                  10                  15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
            20                  25                  30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Ala Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175
```

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```
Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380
```

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```
Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Gln Met Ala Ser Leu Ala Ser Phe Asp Asp Ala Arg Ala Lys Ala
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545                 550                 555                 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
            580                 585                 590
```

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```
Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
        595                 600                 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
    610                 615                 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625                 630                 635                 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
                645                 650                 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
            660                 665                 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
        675                 680                 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
    690                 695                 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705                 710                 715                 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
                725                 730                 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
            740                 745                 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
        755                 760                 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
    770                 775                 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785                 790                 795                 800
```

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```
Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
                805                 810                 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
            820                 825                 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
        835                 840                 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
    850                 855                 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865                 870                 875                 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
                885                 890                 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
        915                 920                 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005
```

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Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu Pro Thr
1010 1015 1020

Leu Ser Glu Gly Leu Pro Ile Ile Ala Thr Ile Ile Asp Gly Val
1025 1030 1035

Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp Pro
1040 1045 1050

Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala Val
1055 1060 1065

Asn Leu Thr Thr Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu Gly
1070 1075 1080

Val Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile
1085 1090 1095

Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg
1100 1105 1110

Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Val Ser Leu
1115 1120 1125

Val Glu Thr Glu Gly Val Phe Thr Leu Leu Asp Asp Lys Ile Met
1130 1135 1140

Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

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```
Val Leu  Glu Val Gln Lys Glu  Glu Leu Asp Leu Ser  Lys Asp Leu
    1205                 1210                 1215

Met Val  Leu Pro Asn Ala Pro  Asn Arg Val Phe Ala  Trp Glu Thr
    1220                 1225                 1230

Gly Trp  Thr Pro Gly Leu Arg  Ser Leu Glu Asn Asp  Gly Thr Lys
    1235                 1240                 1245

Leu Leu  Asp Arg Ile Arg Asp  Asn Tyr Glu Gly Glu  Phe Tyr Trp
    1250                 1255                 1260

Arg Tyr  Phe Ala Phe Ile Ala  Asp Ala Leu Ile Thr  Thr Leu Lys
    1265                 1270                 1275

Pro Arg  Tyr Glu Asp Thr Asn  Ile Arg Ile Asn Leu  Asp Ser Asn
    1280                 1285                 1290

Thr Arg  Ser Phe Ile Val Pro  Ile Ile Thr Thr Glu  Tyr Ile Arg
    1295                 1300                 1305

Glu Lys  Leu Ser Tyr Ser Phe  Tyr Gly Ser Gly Gly  Thr Tyr Ala
    1310                 1315                 1320

Leu Ser  Leu Ser Gln Tyr Asn  Met Gly Ile Asn Ile  Glu Leu Ser
    1325                 1330                 1335

Glu Ser  Asp Val Trp Ile Ile  Asp Val Asp Asn Val  Val Arg Asp
    1340                 1345                 1350

Val Thr  Ile Glu Ser Asp Lys  Ile Lys Lys Gly Asp  Leu Ile Glu
    1355                 1360                 1365

Gly Ile  Leu Ser Thr Leu Ser  Ile Glu Glu Asn Lys  Ile Ile Leu
    1370                 1375                 1380

Asn Ser  His Glu Ile Asn Phe  Ser Gly Glu Val Asn  Gly Ser Asn
    1385                 1390                 1395
```

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```
Gly Phe  Val Ser Leu Thr Phe  Ser Ile Leu Glu Gly  Ile Asn Ala
    1400                1405                1410

Ile Ile  Glu Val Asp Leu Leu  Ser Lys Ser Tyr Lys  Leu Leu Ile
    1415                1420                1425

Ser Gly  Glu Leu Lys Ile Leu  Met Leu Asn Ser Asn  His Ile Gln
    1430                1435                1440

Gln Lys  Ile Asp Tyr Ile Gly  Phe Asn Ser Glu Leu  Gln Lys Asn
    1445                1450                1455

Ile Pro  Tyr Ser Phe Val Asp  Ser Glu Gly Lys Glu  Asn Gly Phe
    1460                1465                1470

Ile Asn  Gly Ser Thr Lys Glu  Gly Leu Phe Val Ser  Glu Leu Pro
    1475                1480                1485

Asp Val  Val Leu Ile Ser Lys  Val Tyr Met Asp Asp  Ser Lys Pro
    1490                1495                1500

Ser Phe  Gly Tyr Tyr Ser Asn  Asn Leu Lys Asp Val  Lys Val Ile
    1505                1510                1515

Thr Lys  Asp Asn Val Asn Ile  Leu Thr Gly Tyr Tyr  Leu Lys Asp
    1520                1525                1530

Asp Ile  Lys Ile Ser Leu Ser  Leu Thr Leu Gln Asp  Glu Lys Thr
    1535                1540                1545

Ile Lys  Leu Asn Ser Val His  Leu Asp Glu Ser Gly  Val Ala Glu
    1550                1555                1560

Ile Leu  Lys Phe Met Asn Arg  Lys Gly Asn Thr Asn  Thr Ser Asp
    1565                1570                1575

Ser Leu  Met Ser Phe Leu Glu  Ser Met Asn Ile Lys  Ser Ile Phe
    1580                1585                1590
```

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Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

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Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Tyr Lys Tyr Tyr Phe Asn Ser Asp Gly Val
1970 1975 1980

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Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

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Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

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<210> 350
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 350

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1               5                  10                  15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
            20                  25                  30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Ala Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
```

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```
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Gly Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
```

```
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Gln Met Ala Ser Leu Ala Ser Phe Asp Asp Ala Arg Ala Lys Ala
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545                 550                 555                 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
```

580 585 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
595 600 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
610 615 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625 630 635 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
645 650 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
660 665 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
675 680 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
690 695 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705 710 715 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
725 730 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
740 745 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
755 760 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
770 775 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu

785 790 795 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
805 810 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
820 825 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
835 840 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
850 855 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865 870 875 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
885 890 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
900 905 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
915 920 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
930 935 940

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945 950 955 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
965 970 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
980 985 990

Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp Ala Ala Lys Val Val Glu

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995 1000 1005

Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu Pro Thr
1010 1015 1020

Leu Ser Glu Gly Leu Pro Ile Ile Ala Thr Ile Ile Asp Gly Val
1025 1030 1035

Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp Pro
1040 1045 1050

Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala Val
1055 1060 1065

Asn Leu Thr Thr Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu Gly
1070 1075 1080

Val Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile
1085 1090 1095

Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg
1100 1105 1110

Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Val Ser Leu
1115 1120 1125

Val Glu Thr Glu Gly Val Phe Thr Leu Leu Asp Asp Lys Ile Met
1130 1135 1140

Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr Asp

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1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile Leu
1370 1375 1380

Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser Asn

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1385 1390 1395

Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys Thr
1535 1540 1545

Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Arg Lys Gly Asn Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe

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1580 1585 1590

Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp

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1775 1780 1785

Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Tyr Lys Tyr Tyr Phe Asn Ser Asp Gly Val

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1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp

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2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu

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2360 2365

<210> 351
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 351

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Ala Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
130 135 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145 150 155 160

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Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Gly Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365
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Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Gln Met Ala Ser Leu Ala Ser Phe Asp Asp Ala Arg Ala Lys Ala
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545                 550                 555                 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575
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Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
580 585 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
595 600 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
610 615 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625 630 635 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
645 650 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
660 665 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
675 680 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
690 695 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705 710 715 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
725 730 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
740 745 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
755 760 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
770 775 780

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```
Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785                 790                 795                 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
                805                 810                 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
            820                 825                 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
        835                 840                 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
    850                 855                 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865                 870                 875                 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
                885                 890                 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
        915                 920                 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990
```

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```
Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005


Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020


Leu Ser  Glu Gly Leu Pro Ile  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035


Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050


Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
    1055                1060                1065


Asn Leu  Thr Thr Ala Thr Thr  Ala Ile Ile Thr Ser  Ser Leu Gly
    1070                1075                1080


Val Ala  Ser Gly Phe Ser Ile  Leu Leu Val Pro Leu  Ala Gly Ile
    1085                1090                1095


Ser Ala  Gly Ile Pro Ser Leu  Val Asn Asn Glu Leu  Val Leu Arg
    1100                1105                1110


Asp Lys  Ala Thr Lys Val Val  Asp Tyr Phe Lys His  Val Ser Leu
    1115                1120                1125


Val Glu  Thr Glu Gly Val Phe  Thr Leu Leu Asp Asp  Lys Ile Met
    1130                1135                1140


Met Pro  Gln Asp Asp Leu Val  Ile Ser Glu Ile Asp  Phe Asn Asn
    1145                1150                1155


Asn Ser  Ile Val Leu Gly Lys  Cys Glu Ile Trp Arg  Met Glu Gly
    1160                1165                1170


Gly Ser  Gly His Thr Val Thr  Asp Asp Ile Asp His  Phe Phe Ser
    1175                1180                1185
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```
Ala Pro  Ser Ile Thr Tyr Arg  Glu Pro His Leu Ser  Ile Tyr Asp
    1190                 1195                 1200

Val Leu  Glu Val Gln Lys Glu  Glu Leu Asp Leu Ser  Lys Asp Leu
    1205                 1210                 1215

Met Val  Leu Pro Asn Ala Pro  Asn Arg Val Phe Ala  Trp Glu Thr
    1220                 1225                 1230

Gly Trp  Thr Pro Gly Leu Arg  Ser Leu Glu Asn Asp  Gly Thr Lys
    1235                 1240                 1245

Leu Leu  Asp Arg Ile Arg Asp  Asn Tyr Glu Gly Glu  Phe Tyr Trp
    1250                 1255                 1260

Arg Tyr  Phe Ala Phe Ile Ala  Asp Ala Leu Ile Thr  Thr Leu Lys
    1265                 1270                 1275

Pro Arg  Tyr Glu Asp Thr Asn  Ile Arg Ile Asn Leu  Asp Ser Asn
    1280                 1285                 1290

Thr Arg  Ser Phe Ile Val Pro  Ile Ile Thr Thr Glu  Tyr Ile Arg
    1295                 1300                 1305

Glu Lys  Leu Ser Tyr Ser Phe  Tyr Gly Ser Gly Gly  Thr Tyr Ala
    1310                 1315                 1320

Leu Ser  Leu Ser Gln Tyr Asn  Met Gly Ile Asn Ile  Glu Leu Ser
    1325                 1330                 1335

Glu Ser  Asp Val Trp Ile Ile  Asp Val Asp Asn Val  Val Arg Asp
    1340                 1345                 1350

Val Thr  Ile Glu Ser Asp Lys  Ile Lys Lys Gly Asp  Leu Ile Glu
    1355                 1360                 1365

Gly Ile  Leu Ser Thr Leu Ser  Ile Glu Glu Asn Lys  Ile Ile Leu
    1370                 1375                 1380
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Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys Thr
1535 1540 1545

Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Arg Lys Gly Asn Thr Asn Thr Ser Asp
1565 1570 1575

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Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe
1580 1585 1590

Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

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Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

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```
Asn Gln  Ile Gly Asp Tyr Lys  Tyr Tyr Phe Asn Ser  Asp Gly Val
    1970                 1975                 1980

Met Gln  Lys Gly Phe Val Ser  Ile Asn Asp Asn Lys  His Tyr Phe
    1985                 1990                 1995

Asp Asp  Ser Gly Val Met Lys  Val Gly Tyr Thr Glu  Ile Asp Gly
    2000                 2005                 2010

Lys His  Phe Tyr Phe Ala Glu  Asn Gly Glu Met Gln  Ile Gly Val
    2015                 2020                 2025

Phe Asn  Thr Glu Asp Gly Phe  Lys Tyr Phe Ala His  His Asn Glu
    2030                 2035                 2040

Asp Leu  Gly Asn Glu Glu Gly  Glu Glu Ile Ser Tyr  Ser Gly Ile
    2045                 2050                 2055

Leu Asn  Phe Asn Asn Lys Ile  Tyr Tyr Phe Asp Asp  Ser Phe Thr
    2060                 2065                 2070

Ala Val  Val Gly Trp Lys Asp  Leu Glu Asp Gly Ser  Lys Tyr Tyr
    2075                 2080                 2085

Phe Asp  Glu Asp Thr Ala Glu  Ala Tyr Ile Gly Leu  Ser Leu Ile
    2090                 2095                 2100

Asn Asp  Gly Gln Tyr Tyr Phe  Asn Asp Asp Gly Ile  Met Gln Val
    2105                 2110                 2115

Gly Phe  Val Thr Ile Asn Asp  Lys Val Phe Tyr Phe  Ser Asp Ser
    2120                 2125                 2130

Gly Ile  Ile Glu Ser Gly Val  Gln Asn Ile Asp Asp  Asn Tyr Phe
    2135                 2140                 2145

Tyr Ile  Asp Asp Asn Gly Ile  Val Gln Ile Gly Val  Phe Asp Thr
    2150                 2155                 2160
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Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

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Ala Gln Leu Val Ile Ser Glu
    2360   2365

<210> 352
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 352

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1   5   10   15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
            20   25   30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35   40   45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50   55   60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65   70   75   80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85   90   95

Leu His Phe Val Ala Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100   105   110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115   120   125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130   135   140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu

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145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
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355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Gln Met Ala Ser Leu Ala Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
530 535 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545 550 555 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr

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565 570 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
580 585 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
595 600 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
610 615 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625 630 635 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
645 650 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
660 665 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
675 680 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
690 695 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705 710 715 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
725 730 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
740 745 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
755 760 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn

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770 775 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785 790 795 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
805 810 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
820 825 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
835 840 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
850 855 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865 870 875 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
885 890 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
900 905 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
915 920 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
930 935 940

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945 950 955 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
965 970 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu

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            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Ile  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050

Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
    1055                1060                1065

Asn Leu  Thr Thr Ala Thr Thr  Ala Ile Ile Thr Ser  Ser Leu Gly
    1070                1075                1080

Val Ala  Ser Gly Phe Ser Ile  Leu Leu Val Pro Leu  Ala Gly Ile
    1085                1090                1095

Ser Ala  Gly Ile Pro Ser Leu  Val Asn Asn Glu Leu  Val Leu Arg
    1100                1105                1110

Asp Lys  Ala Thr Lys Val Val  Asp Tyr Phe Lys His  Val Ser Leu
    1115                1120                1125

Val Glu  Thr Glu Gly Val Phe  Thr Leu Leu Asp Asp  Lys Ile Met
    1130                1135                1140

Met Pro  Gln Asp Asp Leu Val  Ile Ser Glu Ile Asp  Phe Asn Asn
    1145                1150                1155

Asn Ser  Ile Val Leu Gly Lys  Cys Glu Ile Trp Arg  Met Glu Gly
    1160                1165                1170

Gly Ser  Gly His Thr Val Thr  Asp Asp Ile Asp His  Phe Phe Ser
```

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1175 1180 1185

Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile Leu

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1370 1375 1380

Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys Thr
1535 1540 1545

Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Arg Lys Gly Asn Thr Asn Thr Ser Asp

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1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe
1580 1585 1590

Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys

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1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu

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1955 1960 1965

Asn Gln Ile Gly Asp Tyr Lys Tyr Tyr Phe Asn Ser Asp Gly Val
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr

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2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr

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2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 353
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 353

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Ala Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
130 135 140

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```
Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350
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Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Gln Met Ala Ser Leu Ala Ser Phe Asp Asp Ala Arg Ala Lys Ala
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545                 550                 555                 560
```

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```
Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
            580                 585                 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
        595                 600                 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
    610                 615                 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625                 630                 635                 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
                645                 650                 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
            660                 665                 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
        675                 680                 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
    690                 695                 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705                 710                 715                 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
                725                 730                 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
            740                 745                 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
        755                 760                 765
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```
Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
    770                 775                 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785                 790                 795                 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
                805                 810                 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
            820                 825                 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
        835                 840                 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
    850                 855                 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865                 870                 875                 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
                885                 890                 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
        915                 920                 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
                965                 970                 975
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Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Ile  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050

Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
    1055                1060                1065

Asn Leu  Thr Thr Ala Thr Thr  Ala Ile Ile Thr Ser  Ser Leu Gly
    1070                1075                1080

Val Ala  Ser Gly Phe Ser Ile  Leu Leu Val Pro Leu  Ala Gly Ile
    1085                1090                1095

Ser Ala  Gly Ile Pro Ser Leu  Val Asn Asn Glu Leu  Val Leu Arg
    1100                1105                1110

Asp Lys  Ala Thr Lys Val Val  Asp Tyr Phe Lys His  Val Ser Leu
    1115                1120                1125

Val Glu  Thr Glu Gly Val Phe  Thr Leu Leu Asp Asp  Lys Ile Met
    1130                1135                1140

Met Pro  Gln Asp Asp Leu Val  Ile Ser Glu Ile Asp  Phe Asn Asn
    1145                1150                1155

Asn Ser  Ile Val Leu Gly Lys  Cys Glu Ile Trp Arg  Met Glu Gly
    1160                1165                1170
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Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

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Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile Leu
1370 1375 1380

Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys Thr
1535 1540 1545

Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala Glu
1550 1555 1560

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Ile Leu Lys Phe Met Asn Arg Lys Gly Ser Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe
1580 1585 1590

Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

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Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

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Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Val
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

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Tyr Ile  Asp Asp Asn Gly Ile  Val Gln Ile Gly Val  Phe Asp Thr
    2150                2155                2160

Ser Asp  Gly Tyr Lys Tyr Phe  Ala Pro Ala Asn Thr  Val Asn Asp
    2165                2170                2175

Asn Ile  Tyr Gly Gln Ala Val  Glu Tyr Ser Gly Leu  Val Arg Val
    2180                2185                2190

Gly Glu  Asp Val Tyr Tyr Phe  Gly Glu Thr Tyr Thr  Ile Glu Thr
    2195                2200                2205

Gly Trp  Ile Tyr Asp Met Glu  Asn Glu Ser Asp Lys  Tyr Tyr Phe
    2210                2215                2220

Asn Pro  Glu Thr Lys Lys Ala  Cys Lys Gly Ile Asn  Leu Ile Asp
    2225                2230                2235

Asp Ile  Lys Tyr Tyr Phe Asp  Glu Lys Gly Ile Met  Arg Thr Gly
    2240                2245                2250

Leu Ile  Ser Phe Glu Asn Asn  Asn Tyr Tyr Phe Asn  Glu Asn Gly
    2255                2260                2265

Glu Met  Gln Phe Gly Tyr Ile  Asn Ile Glu Asp Lys  Met Phe Tyr
    2270                2275                2280

Phe Gly  Glu Asp Gly Val Met  Gln Ile Gly Val Phe  Asn Thr Pro
    2285                2290                2295

Asp Gly  Phe Lys Tyr Phe Ala  His Gln Asn Thr Leu  Asp Glu Asn
    2300                2305                2310

Phe Glu  Gly Glu Ser Ile Asn  Tyr Thr Gly Trp Leu  Asp Leu Asp
    2315                2320                2325

Glu Lys  Arg Tyr Tyr Phe Thr  Asp Glu Tyr Ile Ala  Ala Thr Gly
    2330                2335                2340
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Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 354
<211> 2366
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 354

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Val Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Thr Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Ile
65 70 75 80

Glu Ile Leu Glu Leu Lys Asn Ser Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Ile Ala Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile

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130 135 140

Ile Glu Ser Ala Ser Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145 150 155 160

Asn Asp Pro Glu Phe Asn His Thr Ala Phe Phe Arg Lys Arg Met Gln
165 170 175

Ile Ile Tyr Asp Lys Gln Gln Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
180 185 190

Lys Glu Glu Asn Pro Asp Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
195 200 205

Leu Ser Asn Glu Tyr Ser Lys Asp Ile Asp Glu Leu Asn Ala Tyr Ile
210 215 220

Glu Glu Ser Leu Asn Lys Val Thr Glu Asn Ser Gly Asn Asp Val Arg
225 230 235 240

Asn Phe Glu Glu Phe Lys Thr Gly Glu Val Phe Asn Leu Tyr Glu Gln
245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Gly Ala Ser Asp Ile Leu Arg
260 265 270

Val Ala Ile Leu Lys Asn Ile Gly Gly Val Tyr Leu Asp Val Ala Met
275 280 285

Leu Pro Gly Ile His Pro Asp Leu Phe Lys Asp Ile Asn Lys Pro Asp
290 295 300

Ser Val Lys Thr Ala Val Asp Trp Glu Glu Met Gln Leu Glu Ala Ile
305 310 315 320

Met Lys His Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Lys His Phe Asp
325 330 335

Thr Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser

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            340                 345                 350

Lys Ser Asp Lys Ser Glu Ile Phe Leu Pro Leu Gly Asp Ile Glu Val
        355                 360                 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Ala Lys Gly Ser Ile Ile Asn
    370                 375                 380

Gln Ala Leu Ile Ser Ala Lys Asp Ser Tyr Cys Ser Asp Leu Leu Ile
385                 390                 395                 400

Lys Gln Ile Gln Asn Arg Tyr Lys Ile Leu Asn Asp Thr Leu Gly Pro
                405                 410                 415

Ile Ile Ser Gln Gly Asn Asp Phe Asn Thr Thr Met Asn Asn Phe Gly
            420                 425                 430

Glu Ser Leu Gly Ala Ile Ala Asn Glu Glu Asn Ile Ser Phe Ile Ala
        435                 440                 445

Lys Ile Gly Ser Tyr Leu Arg Val Gly Phe Tyr Pro Glu Ala Asn Thr
    450                 455                 460

Thr Ile Thr Leu Ser Gly Pro Thr Ile Tyr Ala Gly Ala Tyr Lys Asp
465                 470                 475                 480

Leu Leu Thr Phe Lys Glu Met Ser Ile Asp Thr Ser Ile Leu Ser Ser
                485                 490                 495

Glu Leu Arg Asn Phe Glu Phe Pro Lys Val Asn Ile Ser Gln Ala Thr
            500                 505                 510

Glu Gln Gln Lys Asn Ser Leu Ala Gln Phe Asn Glu Glu Arg Ala Lys
        515                 520                 525

Ile Gln Phe Glu Glu Tyr Lys Lys Asn Tyr Phe Glu Gly Ala Leu Gly
    530                 535                 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Thr Val Thr Asp Lys Glu
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545                 550                 555                 560

Tyr Leu Leu Glu Lys Ile Ser Ser Ser Thr Lys Ser Ser Glu Arg Gly
                565                 570                 575

Tyr Val His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
            580                 585                 590

Ala Ala Cys Asn Leu Phe Ala Lys Asn Pro Tyr Asp Ser Ile Leu Phe
        595                 600                 605

Gln Lys Asn Ile Glu Asp Ser Glu Val Ala Tyr Tyr Tyr Asn Pro Thr
    610                 615                 620

Asp Ser Glu Ile Gln Glu Ile Asp Lys Tyr Arg Ile Pro Asp Arg Ile
625                 630                 635                 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Ala
                645                 650                 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser
            660                 665                 670

Ser Glu Ile Glu Thr Ala Ile Gly Leu Ala Lys Glu Asp Ile Ser Pro
        675                 680                 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser
    690                 695                 700

Val Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Arg Val Lys
705                 710                 715                 720

Asp Lys Val Ser Glu Leu Met Pro Ser Met Ser Gln Asp Ser Ile Ile
                725                 730                 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg
            740                 745                 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
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        755                 760                 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
    770                 775                 780

Asn Lys Ile Ile Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785                 790                 795                 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu
                805                 810                 815

Glu Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
            820                 825                 830

Glu Thr Gln Val Val Glu Glu Arg Ile Glu Glu Ala Lys Ser Leu Thr
        835                 840                 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser
    850                 855                 860

Ile Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp
865                 870                 875                 880

Ser His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe
                885                 890                 895

Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
            900                 905                 910

Thr Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu
        915                 920                 925

Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
    930                 935                 940

Val Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn
945                 950                 955                 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu
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965 970 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
980 985 990

Leu Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp Ala Ala Lys Val Val
995 1000 1005

Glu Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu Pro
1010 1015 1020

Thr Leu Ser Glu Gly Leu Pro Ile Ile Ala Thr Ile Ile Asp Gly
1025 1030 1035

Val Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp
1040 1045 1050

Pro Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala
1055 1060 1065

Val Asn Leu Thr Thr Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu
1070 1075 1080

Gly Ile Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly
1085 1090 1095

Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu
1100 1105 1110

Arg Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Val Ser
1115 1120 1125

Leu Val Glu Thr Glu Gly Val Phe Thr Leu Leu Asp Asp Lys Val
1130 1135 1140

Met Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn
1145 1150 1155

Asn Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu

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1160 1165 1170

Gly Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe
1175 1180 1185

Ser Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr
1190 1195 1200

Asp Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp
1205 1210 1215

Leu Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu
1220 1225 1230

Thr Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr
1235 1240 1245

Lys Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr
1250 1255 1260

Trp Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu
1265 1270 1275

Lys Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser
1280 1285 1290

Asn Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile
1295 1300 1305

Arg Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr
1310 1315 1320

Ala Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu
1325 1330 1335

Ser Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg
1340 1345 1350

Asp Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile

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1355 1360 1365

Glu Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile
1370 1375 1380

Leu Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser
1385 1390 1395

Asn Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn
1400 1405 1410

Ala Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu
1415 1420 1425

Ile Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile
1430 1435 1440

Gln Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys
1445 1450 1455

Asn Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly
1460 1465 1470

Phe Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu
1475 1480 1485

Pro Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys
1490 1495 1500

Pro Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val
1505 1510 1515

Ile Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys
1520 1525 1530

Asp Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys
1535 1540 1545

Thr Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala

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1550 1555 1560

Glu Ile Leu Lys Phe Met Asn Arg Lys Gly Ser Thr Asn Thr Ser
1565 1570 1575

Asp Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile
1580 1585 1590

Phe Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala
1595 1600 1605

Asn Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe
1610 1615 1620

Ile Cys Asp Glu Asn Asn Asn Ile Gln Pro Tyr Phe Ile Lys Phe
1625 1630 1635

Asn Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln
1640 1645 1650

Asn Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp
1655 1660 1665

Ile Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly
1670 1675 1680

Ile Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr
1685 1690 1695

Thr Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr
1700 1705 1710

Tyr Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys
1715 1720 1725

Ile Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser
1730 1735 1740

Asn Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn

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1745 1750 1755

Lys Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp
1760 1765 1770

Lys Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln
1775 1780 1785

Asp Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr
1790 1795 1800

Tyr Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu
1805 1810 1815

Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser
1820 1825 1830

Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro
1835 1840 1845

Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys
1850 1855 1860

Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu
1865 1870 1875

Thr Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val
1880 1885 1890

Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
1895 1900 1905

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile
1910 1915 1920

Asp Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe
1925 1930 1935

Glu Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly

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1940 1945 1950

Glu Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly
1955 1960 1965

Leu Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly
1970 1975 1980

Val Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr
1985 1990 1995

Phe Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp
2000 2005 2010

Gly Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly
2015 2020 2025

Val Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn
2030 2035 2040

Glu Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly
2045 2050 2055

Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe
2060 2065 2070

Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr
2075 2080 2085

Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu
2090 2095 2100

Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln
2105 2110 2115

Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp
2120 2125 2130

Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr

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2135 2140 2145

Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp
2150 2155 2160

Thr Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn
2165 2170 2175

Asp Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg
2180 2185 2190

Val Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu
2195 2200 2205

Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr
2210 2215 2220

Phe Asp Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile
2225 2230 2235

Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr
2240 2245 2250

Gly Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn
2255 2260 2265

Gly Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe
2270 2275 2280

Tyr Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr
2285 2290 2295

Pro Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu
2300 2305 2310

Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu
2315 2320 2325

Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr

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2330 2335 2340

Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp
2345 2350 2355

Thr Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 355
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 355

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
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Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Ala Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

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Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
130 135 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145 150 155 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
165 170 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
180 185 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
195 200 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
210 215 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225 230 235 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
260 265 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Ala Met
275 280 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
290 295 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
325 330 335

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Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Gln Met Ala Ser Leu Ala Ser Phe Asp Asp Ser Arg Ala Lys Ala
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540
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Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545                 550                 555                 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
            580                 585                 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
        595                 600                 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
    610                 615                 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625                 630                 635                 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
                645                 650                 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
            660                 665                 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
        675                 680                 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
    690                 695                 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705                 710                 715                 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
                725                 730                 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
            740                 745                 750
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Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
        755                 760                 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
    770                 775                 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785                 790                 795                 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
                805                 810                 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
            820                 825                 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
        835                 840                 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
    850                 855                 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865                 870                 875                 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
                885                 890                 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
        915                 920                 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960
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Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
               965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
           980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Ile  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050

Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
    1055                1060                1065

Asn Leu  Thr Thr Ala Thr Thr  Ala Ile Ile Thr Ser  Ser Leu Gly
    1070                1075                1080

Val Ala  Ser Gly Phe Ser Ile  Leu Leu Val Pro Leu  Ala Gly Ile
    1085                1090                1095

Ser Ala  Gly Ile Pro Ser Leu  Val Asn Asn Glu Leu  Val Leu Arg
    1100                1105                1110

Asp Lys  Ala Thr Lys Val Val  Asp Tyr Phe Lys His  Val Ser Leu
    1115                1120                1125

Val Glu  Thr Glu Gly Val Phe  Thr Leu Leu Asp Asp  Lys Ile Met
    1130                1135                1140

Met Pro  Gln Asp Asp Leu Val  Ile Ser Glu Ile Asp  Phe Asn Asn
    1145                1150                1155
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Asn Ser  Ile Val Leu Gly Lys  Cys Glu Ile Trp Arg  Met Glu Gly
    1160                 1165                 1170

Gly Ser  Gly His Thr Val Thr  Asp Asp Ile Asp His  Phe Phe Ser
    1175                 1180                 1185

Ala Pro  Ser Ile Thr Tyr Arg  Glu Pro His Leu Ser  Ile Tyr Asp
    1190                 1195                 1200

Val Leu  Glu Val Gln Lys Glu  Glu Leu Asp Leu Ser  Lys Asp Leu
    1205                 1210                 1215

Met Val  Leu Pro Asn Ala Pro  Asn Arg Val Phe Ala  Trp Glu Thr
    1220                 1225                 1230

Gly Trp  Thr Pro Gly Leu Arg  Ser Leu Glu Asn Asp  Gly Thr Lys
    1235                 1240                 1245

Leu Leu  Asp Arg Ile Arg Asp  Asn Tyr Glu Gly Glu  Phe Tyr Trp
    1250                 1255                 1260

Arg Tyr  Phe Ala Phe Ile Ala  Asp Ala Leu Ile Thr  Thr Leu Lys
    1265                 1270                 1275

Pro Arg  Tyr Glu Asp Thr Asn  Ile Arg Ile Asn Leu  Asp Ser Asn
    1280                 1285                 1290

Thr Arg  Ser Phe Ile Val Pro  Ile Ile Thr Thr Glu  Tyr Ile Arg
    1295                 1300                 1305

Glu Lys  Leu Ser Tyr Ser Phe  Tyr Gly Ser Gly Gly  Thr Tyr Ala
    1310                 1315                 1320

Leu Ser  Leu Ser Gln Tyr Asn  Met Gly Ile Asn Ile  Glu Leu Ser
    1325                 1330                 1335

Glu Ser  Asp Val Trp Ile Ile  Asp Val Asp Asn Val  Val Arg Asp
    1340                 1345                 1350
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Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile Leu
1370 1375 1380

Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys Thr
1535 1540 1545

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```
Ile Lys  Leu Asn Ser Val His  Leu Asp Glu Ser Gly  Val Ala Glu
    1550                1555                1560

Ile Leu  Lys Phe Met Asn Arg  Lys Gly Ser Thr Asn  Thr Ser Asp
    1565                1570                1575

Ser Leu  Met Ser Phe Leu Glu  Ser Met Asn Ile Lys  Ser Ile Phe
    1580                1585                1590

Val Asn  Phe Leu Gln Ser Asn  Ile Lys Phe Ile Leu  Asp Ala Asn
    1595                1600                1605

Phe Ile  Ile Ser Gly Thr Thr  Ser Ile Gly Gln Phe  Glu Phe Ile
    1610                1615                1620

Cys Asp  Glu Asn Asp Asn Ile  Gln Pro Tyr Phe Ile  Lys Phe Asn
    1625                1630                1635

Thr Leu  Glu Thr Asn Tyr Thr  Leu Tyr Val Gly Asn  Arg Gln Asn
    1640                1645                1650

Met Ile  Val Glu Pro Asn Tyr  Asp Leu Asp Asp Ser  Gly Asp Ile
    1655                1660                1665

Ser Ser  Thr Val Ile Asn Phe  Ser Gln Lys Tyr Leu  Tyr Gly Ile
    1670                1675                1680

Asp Ser  Cys Val Asn Lys Val  Val Ile Ser Pro Asn  Ile Tyr Thr
    1685                1690                1695

Asp Glu  Ile Asn Ile Thr Pro  Val Tyr Glu Thr Asn  Asn Thr Tyr
    1700                1705                1710

Pro Glu  Val Ile Val Leu Asp  Ala Asn Tyr Ile Asn  Glu Lys Ile
    1715                1720                1725

Asn Val  Asn Ile Asn Asp Leu  Ser Ile Arg Tyr Val  Trp Ser Asn
    1730                1735                1740
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Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp
1925 1930 1935

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Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Val
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

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Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

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Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 356
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 356

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Ala Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val

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        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
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325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Gln Met Ala Ser Leu Ala Ser Phe Asp Asp Ser Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu

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530 535 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545 550 555 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
565 570 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
580 585 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
595 600 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
610 615 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625 630 635 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
645 650 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
660 665 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
675 680 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
690 695 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705 710 715 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
725 730 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu

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740 745 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
755 760 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
770 775 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785 790 795 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
805 810 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
820 825 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
835 840 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
850 855 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865 870 875 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
885 890 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
900 905 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
915 920 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
930 935 940

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala

945 950 955 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
965 970 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
980 985 990

Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp Ala Ala Lys Val Val Glu
995 1000 1005

Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu Pro Thr
1010 1015 1020

Leu Ser Glu Gly Leu Pro Ile Ile Ala Thr Ile Ile Asp Gly Val
1025 1030 1035

Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp Pro
1040 1045 1050

Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala Val
1055 1060 1065

Asn Leu Thr Thr Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu Gly
1070 1075 1080

Val Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile
1085 1090 1095

Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg
1100 1105 1110

Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Val Ser Leu
1115 1120 1125

Val Glu Thr Glu Gly Val Phe Thr Leu Leu Asp Asp Lys Ile Met
1130 1135 1140

Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn

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1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp

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1340 1345 1350

Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile Leu
1370 1375 1380

Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys Thr

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1535 1540 1545

Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Arg Lys Gly Ser Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe
1580 1585 1590

Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn

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1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp

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1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Val
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser

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2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp

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2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

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<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

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Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
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Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Ala Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

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```
Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320
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```
Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Gln Met Ala Ser Leu Ala Ser Phe Asp Asp Ser Arg Ala Lys Ala
        515                 520                 525
```

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```
Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545                 550                 555                 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
            580                 585                 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
        595                 600                 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
    610                 615                 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625                 630                 635                 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
                645                 650                 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
            660                 665                 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
        675                 680                 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
    690                 695                 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705                 710                 715                 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
                725                 730                 735
```

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```
Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
            740                 745                 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
        755                 760                 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
    770                 775                 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785                 790                 795                 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
                805                 810                 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
            820                 825                 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
        835                 840                 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
    850                 855                 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865                 870                 875                 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
                885                 890                 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
        915                 920                 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940
```

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```
Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Ile  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050

Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
    1055                1060                1065

Asn Leu  Thr Thr Ala Thr Thr  Ala Ile Ile Thr Ser  Ser Leu Gly
    1070                1075                1080

Val Ala  Ser Gly Phe Ser Ile  Leu Leu Val Pro Leu  Ala Gly Ile
    1085                1090                1095

Ser Ala  Gly Ile Pro Ser Leu  Val Asn Asn Glu Leu  Val Leu Arg
    1100                1105                1110

Asp Lys  Ala Thr Lys Val Val  Asp Tyr Phe Lys His  Val Ser Leu
    1115                1120                1125

Val Glu  Thr Glu Gly Val Phe  Thr Leu Leu Asp Asp  Lys Ile Met
    1130                1135                1140
```

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Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

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```
Glu Ser  Asp Val Trp Ile Ile  Asp Val Asp Asn Val  Val Arg Asp
    1340                1345                1350

Val Thr  Ile Glu Ser Asp Lys  Ile Lys Lys Gly Asp  Leu Ile Glu
    1355                1360                1365

Gly Ile  Leu Ser Thr Leu Ser  Ile Glu Glu Asn Lys  Ile Ile Leu
    1370                1375                1380

Asn Ser  His Glu Ile Asn Phe  Ser Gly Glu Val Asn  Gly Ser Asn
    1385                1390                1395

Gly Phe  Val Ser Leu Thr Phe  Ser Ile Leu Glu Gly  Ile Asn Ala
    1400                1405                1410

Ile Ile  Glu Val Asp Leu Leu  Ser Lys Ser Tyr Lys  Leu Leu Ile
    1415                1420                1425

Ser Gly  Glu Leu Lys Ile Leu  Met Leu Asn Ser Asn  His Ile Gln
    1430                1435                1440

Gln Lys  Ile Asp Tyr Ile Gly  Phe Asn Ser Glu Leu  Gln Lys Asn
    1445                1450                1455

Ile Pro  Tyr Ser Phe Val Asp  Ser Glu Gly Lys Glu  Asn Gly Phe
    1460                1465                1470

Ile Asn  Gly Ser Thr Lys Glu  Gly Leu Phe Val Ser  Glu Leu Pro
    1475                1480                1485

Asp Val  Val Leu Ile Ser Lys  Val Tyr Met Asp Asp  Ser Lys Pro
    1490                1495                1500

Ser Phe  Gly Tyr Tyr Ser Asn  Asn Leu Lys Asp Val  Lys Val Ile
    1505                1510                1515

Thr Lys  Asp Asn Val Asn Ile  Leu Thr Gly Tyr Tyr  Leu Lys Asp
    1520                1525                1530
```

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Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys Thr
1535 1540 1545

Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Arg Lys Gly Ser Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe
1580 1585 1590

Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

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```
Asn Val  Asn Ile Asn Asp Leu  Ser Ile Arg Tyr Val  Trp Ser Asn
    1730                1735                1740

Asp Gly  Asn Asp Phe Ile Leu  Met Ser Thr Ser Glu  Glu Asn Lys
    1745                1750                1755

Val Ser  Gln Val Lys Ile Arg  Phe Val Asn Val Phe  Lys Asp Lys
    1760                1765                1770

Thr Leu  Ala Asn Lys Leu Ser  Phe Asn Phe Ser Asp  Lys Gln Asp
    1775                1780                1785

Val Pro  Val Ser Glu Ile Ile  Leu Ser Phe Thr Pro  Ser Tyr Tyr
    1790                1795                1800

Glu Asp  Gly Leu Ile Gly Tyr  Asp Leu Gly Leu Val  Ser Leu Tyr
    1805                1810                1815

Asn Glu  Lys Phe Tyr Ile Asn  Asn Phe Gly Met Met  Val Ser Gly
    1820                1825                1830

Leu Ile  Tyr Ile Asn Asp Ser  Leu Tyr Tyr Phe Lys  Pro Pro Val
    1835                1840                1845

Asn Asn  Leu Ile Thr Gly Phe  Val Thr Val Gly Asp  Asp Lys Tyr
    1850                1855                1860

Tyr Phe  Asn Pro Ile Asn Gly  Gly Ala Ala Ser Ile  Gly Glu Thr
    1865                1870                1875

Ile Ile  Asp Asp Lys Asn Tyr  Tyr Phe Asn Gln Ser  Gly Val Leu
    1880                1885                1890

Gln Thr  Gly Val Phe Ser Thr  Glu Asp Gly Phe Lys  Tyr Phe Ala
    1895                1900                1905

Pro Ala  Asn Thr Leu Asp Glu  Asn Leu Glu Gly Glu  Ala Ile Asp
    1910                1915                1920
```

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```
Phe Thr  Gly Lys Leu Ile Ile  Asp Glu Asn Ile Tyr  Tyr Phe Asp
    1925                1930                1935

Asp Asn  Tyr Arg Gly Ala Val  Glu Trp Lys Glu Leu  Asp Gly Glu
    1940                1945                1950

Met His  Tyr Phe Ser Pro Glu  Thr Gly Lys Ala Phe  Lys Gly Leu
    1955                1960                1965

Asn Gln  Ile Gly Asp Asp Lys  Tyr Tyr Phe Asn Ser  Asp Gly Val
    1970                1975                1980

Met Gln  Lys Gly Phe Val Ser  Ile Asn Asp Asn Lys  His Tyr Phe
    1985                1990                1995

Asp Asp  Ser Gly Val Met Lys  Val Gly Tyr Thr Glu  Ile Asp Gly
    2000                2005                2010

Lys His  Phe Tyr Phe Ala Glu  Asn Gly Glu Met Gln  Ile Gly Val
    2015                2020                2025

Phe Asn  Thr Glu Asp Gly Phe  Lys Tyr Phe Ala His  His Asn Glu
    2030                2035                2040

Asp Leu  Gly Asn Glu Glu Gly  Glu Glu Ile Ser Tyr  Ser Gly Ile
    2045                2050                2055

Leu Asn  Phe Asn Asn Lys Ile  Tyr Tyr Phe Asp Asp  Ser Phe Thr
    2060                2065                2070

Ala Val  Val Gly Trp Lys Asp  Leu Glu Asp Gly Ser  Lys Tyr Tyr
    2075                2080                2085

Phe Asp  Glu Asp Thr Ala Glu  Ala Tyr Ile Gly Leu  Ser Leu Ile
    2090                2095                2100

Asn Asp  Gly Gln Tyr Tyr Phe  Asn Asp Asp Gly Ile  Met Gln Val
    2105                2110                2115
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Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

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Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 358
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 358

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Ala Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn

```
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
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```
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Phe Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Gln Met Ala Ser Leu Ala Ser Phe Asp Asp Ser Arg Ala Lys Ala
```

515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
530 535 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545 550 555 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
565 570 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
580 585 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
595 600 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
610 615 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625 630 635 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
645 650 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
660 665 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
675 680 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
690 695 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705 710 715 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val

725 730 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
740 745 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
755 760 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
770 775 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785 790 795 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
805 810 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
820 825 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
835 840 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
850 855 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865 870 875 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
885 890 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
900 905 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
915 920 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val

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930 935 940

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945 950 955 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
965 970 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
980 985 990

Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp Ala Ala Lys Val Val Glu
995 1000 1005

Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu Pro Thr
1010 1015 1020

Leu Ser Glu Gly Leu Pro Ile Ile Ala Thr Ile Ile Asp Gly Val
1025 1030 1035

Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp Pro
1040 1045 1050

Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala Val
1055 1060 1065

Asn Leu Thr Thr Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu Gly
1070 1075 1080

Val Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile
1085 1090 1095

Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg
1100 1105 1110

Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Val Ser Leu
1115 1120 1125

Val Glu Thr Glu Gly Val Phe Thr Leu Leu Asp Asp Lys Ile Met

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1130 1135 1140

Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser

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1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile Leu
1370 1375 1380

Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp

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1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys Thr
1535 1540 1545

Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Arg Lys Gly Ser Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe
1580 1585 1590

Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile

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1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp

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1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Val
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val

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2105 2110 2115

Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn

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2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

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<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

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Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
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Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

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Leu His Phe Val Ala Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300
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Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Phe Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510
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Gln Gln Met Ala Ser Leu Ala Ser Phe Asp Asp Ser Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
530 535 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545 550 555 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
565 570 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
580 585 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
595 600 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
610 615 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625 630 635 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
645 650 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
660 665 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
675 680 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
690 695 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705 710 715 720

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Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
                725                 730                 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
            740                 745                 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
        755                 760                 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
    770                 775                 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785                 790                 795                 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
                805                 810                 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
            820                 825                 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
        835                 840                 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
    850                 855                 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865                 870                 875                 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
                885                 890                 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
        915                 920                 925
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Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Ile  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050

Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
    1055                1060                1065

Asn Leu  Thr Thr Ala Thr Thr  Ala Ile Ile Thr Ser  Ser Leu Gly
    1070                1075                1080

Val Ala  Ser Gly Phe Ser Ile  Leu Leu Val Pro Leu  Ala Gly Ile
    1085                1090                1095

Ser Ala  Gly Ile Pro Ser Leu  Val Asn Asn Glu Leu  Val Leu Arg
    1100                1105                1110

Asp Lys  Ala Thr Lys Val Val  Asp Tyr Phe Lys His  Val Ser Leu
    1115                1120                1125
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Val Glu Thr Glu Gly Val Phe Thr Leu Leu Asp Asp Lys Ile Met
1130 1135 1140

Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

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Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile Leu
1370 1375 1380

Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

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```
Thr Lys  Asp Asn Val Asn Ile  Leu Thr Gly Tyr Tyr  Leu Lys Asp
    1520                1525                1530

Asp Ile  Lys Ile Ser Leu Ser  Leu Thr Leu Gln Asp  Glu Lys Thr
    1535                1540                1545

Ile Lys  Leu Asn Ser Val His  Leu Asp Glu Ser Gly  Val Ala Glu
    1550                1555                1560

Ile Leu  Lys Phe Met Asn Arg  Lys Gly Ser Thr Asn  Thr Ser Asp
    1565                1570                1575

Ser Leu  Met Ser Phe Leu Glu  Ser Met Asn Ile Lys  Ser Ile Phe
    1580                1585                1590

Val Asn  Phe Leu Gln Ser Asn  Ile Lys Phe Ile Leu  Asp Ala Asn
    1595                1600                1605

Phe Ile  Ile Ser Gly Thr Thr  Ser Ile Gly Gln Phe  Glu Phe Ile
    1610                1615                1620

Cys Asp  Glu Asn Asp Asn Ile  Gln Pro Tyr Phe Ile  Lys Phe Asn
    1625                1630                1635

Thr Leu  Glu Thr Asn Tyr Thr  Leu Tyr Val Gly Asn  Arg Gln Asn
    1640                1645                1650

Met Ile  Val Glu Pro Asn Tyr  Asp Leu Asp Asp Ser  Gly Asp Ile
    1655                1660                1665

Ser Ser  Thr Val Ile Asn Phe  Ser Gln Lys Tyr Leu  Tyr Gly Ile
    1670                1675                1680

Asp Ser  Cys Val Asn Lys Val  Val Ile Ser Pro Asn  Ile Tyr Thr
    1685                1690                1695

Asp Glu  Ile Asn Ile Thr Pro  Val Tyr Glu Thr Asn  Asn Thr Tyr
    1700                1705                1710
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Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala
1895 1900 1905

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```
Pro Ala  Asn Thr Leu Asp Glu  Asn Leu Glu Gly Glu  Ala Ile Asp
    1910                1915                1920

Phe Thr  Gly Lys Leu Ile Ile  Asp Glu Asn Ile Tyr  Tyr Phe Asp
    1925                1930                1935

Asp Asn  Tyr Arg Gly Ala Val  Glu Trp Lys Glu Leu  Asp Gly Glu
    1940                1945                1950

Met His  Tyr Phe Ser Pro Glu  Thr Gly Lys Ala Phe  Lys Gly Leu
    1955                1960                1965

Asn Gln  Ile Gly Asp Asp Lys  Tyr Tyr Phe Asn Ser  Asp Gly Val
    1970                1975                1980

Met Gln  Lys Gly Phe Val Ser  Ile Asn Asp Asn Lys  His Tyr Phe
    1985                1990                1995

Asp Asp  Ser Gly Val Met Lys  Val Gly Tyr Thr Glu  Ile Asp Gly
    2000                2005                2010

Lys His  Phe Tyr Phe Ala Glu  Asn Gly Glu Met Gln  Ile Gly Val
    2015                2020                2025

Phe Asn  Thr Glu Asp Gly Phe  Lys Tyr Phe Ala His  His Asn Glu
    2030                2035                2040

Asp Leu  Gly Asn Glu Glu Gly  Glu Glu Ile Ser Tyr  Ser Gly Ile
    2045                2050                2055

Leu Asn  Phe Asn Asn Lys Ile  Tyr Tyr Phe Asp Asp  Ser Phe Thr
    2060                2065                2070

Ala Val  Val Gly Trp Lys Asp  Leu Glu Asp Gly Ser  Lys Tyr Tyr
    2075                2080                2085

Phe Asp  Glu Asp Thr Ala Glu  Ala Tyr Ile Gly Leu  Ser Leu Ile
    2090                2095                2100
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Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

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Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 360
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 360

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn

```
                85                  90                  95

Leu His Phe Val Ala Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
```

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    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
```

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            500                 505                 510

Gln Gln Met Ala Ser Leu Ala Ser Phe Asp Asp Ala Arg Ala Lys Ala
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545                 550                 555                 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
            580                 585                 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
        595                 600                 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
    610                 615                 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625                 630                 635                 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
                645                 650                 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
            660                 665                 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
        675                 680                 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
    690                 695                 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
```

705 710 715 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
725 730 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
740 745 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
755 760 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
770 775 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785 790 795 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
805 810 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
820 825 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
835 840 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
850 855 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865 870 875 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
885 890 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
900 905 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile

915 920 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
930 935 940

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945 950 955 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
965 970 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
980 985 990

Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp Ala Ala Lys Val Val Glu
995 1000 1005

Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu Pro Thr
1010 1015 1020

Leu Ser Glu Gly Leu Pro Ile Ile Ala Thr Ile Ile Asp Gly Val
1025 1030 1035

Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp Pro
1040 1045 1050

Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala Val
1055 1060 1065

Asn Leu Thr Thr Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu Gly
1070 1075 1080

Ile Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile
1085 1090 1095

Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg
1100 1105 1110

Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Val Ser Leu

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1115 1120 1125

Val Glu Thr Glu Gly Val Phe Thr Leu Leu Asp Asp Lys Ile Met
1130 1135 1140

Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala

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1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile Leu
1370 1375 1380

Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile

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1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys Thr
1535 1540 1545

Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Arg Lys Gly Asn Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe
1580 1585 1590

Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr Tyr

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1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala

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1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Val
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile

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2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro

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2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 361
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 361

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

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```
Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Ala Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Ala Met
        275                 280                 285
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```
Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495
```

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Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Gln Met Ala Ser Leu Ala Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
530 535 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545 550 555 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
565 570 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
580 585 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
595 600 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
610 615 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625 630 635 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
645 650 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
660 665 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
675 680 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
690 695 700

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```
Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705                 710                 715                 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
                725                 730                 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
            740                 745                 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
        755                 760                 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
    770                 775                 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785                 790                 795                 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
                805                 810                 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
            820                 825                 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
        835                 840                 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
    850                 855                 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865                 870                 875                 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Glu Glu Gly Phe Ser
                885                 890                 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910
```

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```
Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
        915                 920                 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Ile  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050

Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
    1055                1060                1065

Asn Leu  Thr Thr Ala Thr Thr  Ala Ile Ile Thr Ser  Ser Leu Gly
    1070                1075                1080

Ile Ala  Ser Gly Phe Ser Ile  Leu Leu Val Pro Leu  Ala Gly Ile
    1085                1090                1095

Ser Ala  Gly Ile Pro Ser Leu  Val Asn Asn Glu Leu  Val Leu Arg
    1100                1105                1110
```

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Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Val Ser Leu
1115 1120 1125

Val Glu Thr Glu Gly Val Phe Thr Leu Leu Asp Asp Lys Ile Met
1130 1135 1140

Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile Arg
1295 1300 1305

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```
Glu Lys  Leu Ser Tyr Ser Phe  Tyr Gly Ser Gly Gly  Thr Tyr Ala
    1310                1315                1320

Leu Ser  Leu Ser Gln Tyr Asn  Met Gly Ile Asn Ile  Glu Leu Ser
    1325                1330                1335

Glu Ser  Asp Val Trp Ile Ile  Asp Val Asp Asn Val  Val Arg Asp
    1340                1345                1350

Val Thr  Ile Glu Ser Asp Lys  Ile Lys Lys Gly Asp  Leu Ile Glu
    1355                1360                1365

Gly Ile  Leu Ser Thr Leu Ser  Ile Glu Glu Asn Lys  Ile Ile Leu
    1370                1375                1380

Asn Ser  His Glu Ile Asn Phe  Ser Gly Glu Val Asn  Gly Ser Asn
    1385                1390                1395

Gly Phe  Val Ser Leu Thr Phe  Ser Ile Leu Glu Gly  Ile Asn Ala
    1400                1405                1410

Ile Ile  Glu Val Asp Leu Leu  Ser Lys Ser Tyr Lys  Leu Leu Ile
    1415                1420                1425

Ser Gly  Glu Leu Lys Ile Leu  Met Leu Asn Ser Asn  His Ile Gln
    1430                1435                1440

Gln Lys  Ile Asp Tyr Ile Gly  Phe Asn Ser Glu Leu  Gln Lys Asn
    1445                1450                1455

Ile Pro  Tyr Ser Phe Val Asp  Ser Glu Gly Lys Glu  Asn Gly Phe
    1460                1465                1470

Ile Asn  Gly Ser Thr Lys Glu  Gly Leu Phe Val Ser  Glu Leu Pro
    1475                1480                1485

Asp Val  Val Leu Ile Ser Lys  Val Tyr Met Asp Asp  Ser Lys Pro
    1490                1495                1500
```

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```
Ser Phe  Gly Tyr Tyr Ser Asn  Asn Leu Lys Asp Val  Lys Val Ile
    1505                1510                1515

Thr Lys  Asp Asn Val Asn Ile  Leu Thr Gly Tyr Tyr  Leu Lys Asp
    1520                1525                1530

Asp Ile  Lys Ile Ser Leu Ser  Leu Thr Leu Gln Asp  Glu Lys Thr
    1535                1540                1545

Ile Lys  Leu Asn Ser Val His  Leu Asp Glu Ser Gly  Val Ala Glu
    1550                1555                1560

Ile Leu  Lys Phe Met Asn Arg  Lys Gly Asn Thr Asn  Thr Ser Asp
    1565                1570                1575

Ser Leu  Met Ser Phe Leu Glu  Ser Met Asn Ile Lys  Ser Ile Phe
    1580                1585                1590

Val Asn  Phe Leu Gln Ser Asn  Ile Lys Phe Ile Leu  Asp Ala Asn
    1595                1600                1605

Phe Ile  Ile Ser Gly Thr Thr  Ser Ile Gly Gln Phe  Glu Phe Ile
    1610                1615                1620

Cys Asp  Glu Asn Asp Asn Ile  Gln Pro Tyr Phe Ile  Lys Phe Asn
    1625                1630                1635

Thr Leu  Glu Thr Asn Tyr Thr  Leu Tyr Val Gly Asn  Arg Gln Asn
    1640                1645                1650

Met Ile  Val Glu Pro Asn Tyr  Asp Leu Asp Asp Ser  Gly Asp Ile
    1655                1660                1665

Ser Ser  Thr Val Ile Asn Phe  Ser Gln Lys Tyr Leu  Tyr Gly Ile
    1670                1675                1680

Asp Ser  Cys Val Asn Lys Val  Val Ile Ser Pro Asn  Ile Tyr Thr
    1685                1690                1695
```

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Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu
1880 1885 1890

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Gln Thr  Gly Val Phe Ser Thr  Glu Asp Gly Phe Lys  Tyr Phe Ala
    1895                1900                1905

Pro Ala  Asn Thr Leu Asp Glu  Asn Leu Glu Gly Glu  Ala Ile Asp
    1910                1915                1920

Phe Thr  Gly Lys Leu Ile Ile  Asp Glu Asn Ile Tyr  Tyr Phe Glu
    1925                1930                1935

Asp Asn  Tyr Arg Gly Ala Val  Glu Trp Lys Glu Leu  Asp Gly Glu
    1940                1945                1950

Met His  Tyr Phe Ser Pro Glu  Thr Gly Lys Ala Phe  Lys Gly Leu
    1955                1960                1965

Asn Gln  Ile Gly Asp Asp Lys  Tyr Tyr Phe Asn Ser  Asp Gly Val
    1970                1975                1980

Met Gln  Lys Gly Phe Val Ser  Ile Asn Asp Asn Lys  His Tyr Phe
    1985                1990                1995

Asp Asp  Ser Gly Val Met Lys  Val Gly Tyr Thr Glu  Ile Asp Gly
    2000                2005                2010

Lys Tyr  Phe Tyr Phe Ala Glu  Asn Gly Glu Met Gln  Ile Gly Val
    2015                2020                2025

Phe Asn  Thr Glu Asp Gly Phe  Lys Tyr Phe Ala His  His Asn Glu
    2030                2035                2040

Asp Leu  Gly Asn Glu Glu Gly  Glu Glu Ile Ser Tyr  Ser Gly Ile
    2045                2050                2055

Leu Asn  Phe Asn Asn Lys Ile  Tyr Tyr Phe Asp Asp  Ser Phe Thr
    2060                2065                2070

Ala Val  Val Gly Trp Lys Asp  Leu Glu Asp Gly Ser  Lys Tyr Tyr
    2075                2080                2085
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Phe Asp  Glu Asp Thr Ala Glu  Ala Tyr Ile Gly Leu  Ser Leu Ile
    2090                2095                2100

Asn Asp  Gly Gln Tyr Tyr Phe  Asn Asp Asp Gly Ile  Met Gln Val
    2105                2110                2115

Gly Phe  Val Thr Ile Asn Asp  Lys Val Phe Tyr Phe  Ser Asp Ser
    2120                2125                2130

Gly Ile  Ile Glu Ser Gly Val  Gln Asn Ile Asp Asp  Asn Tyr Phe
    2135                2140                2145

Tyr Ile  Asp Asp Asn Gly Ile  Val Gln Ile Gly Val  Phe Asp Thr
    2150                2155                2160

Ser Asp  Gly Tyr Lys Tyr Phe  Ala Pro Ala Asn Thr  Val Asn Asp
    2165                2170                2175

Asn Ile  Tyr Gly Gln Ala Val  Glu Tyr Ser Gly Leu  Val Arg Val
    2180                2185                2190

Gly Glu  Asp Val Tyr Tyr Phe  Gly Glu Thr Tyr Thr  Ile Glu Thr
    2195                2200                2205

Gly Trp  Ile Tyr Asp Met Glu  Asn Glu Ser Asp Lys  Tyr Tyr Phe
    2210                2215                2220

Asn Pro  Glu Thr Lys Lys Ala  Cys Lys Gly Ile Asn  Leu Ile Asp
    2225                2230                2235

Asp Ile  Lys Tyr Tyr Phe Asp  Glu Lys Gly Ile Met  Arg Thr Gly
    2240                2245                2250

Leu Ile  Ser Phe Glu Asn Asn  Asn Tyr Tyr Phe Asn  Glu Asn Gly
    2255                2260                2265

Glu Met  Gln Phe Gly Tyr Ile  Asn Ile Glu Asp Lys  Met Phe Tyr
    2270                2275                2280
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Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 362
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 362

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr

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65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Ala Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
130 135 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145 150 155 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
165 170 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
180 185 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
195 200 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
210 215 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225 230 235 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
260 265 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Ala Met

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275 280 285

Leu Pro Gly Ile Gln Pro Gly Leu Phe Glu Ser Ile Glu Lys Pro Ser
290 295 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp

485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Gln Met Ala Ser Leu Ala Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
530 535 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545 550 555 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
565 570 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
580 585 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
595 600 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
610 615 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625 630 635 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
645 650 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
660 665 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
675 680 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile

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690 695 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705 710 715 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
725 730 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
740 745 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
755 760 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
770 775 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785 790 795 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
805 810 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
820 825 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
835 840 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
850 855 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865 870 875 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
885 890 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr

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            900                 905                 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
        915                 920                 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Ile  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050

Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
    1055                1060                1065

Asn Leu  Thr Thr Ala Thr Thr  Ala Ile Ile Thr Ser  Ser Leu Gly
    1070                1075                1080

Val Ala  Ser Gly Phe Ser Ile  Leu Leu Val Pro Leu  Ala Gly Ile
    1085                1090                1095

Ser Ala  Gly Ile Pro Ser Leu  Val Asn Asn Glu Leu  Val Leu Arg
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    1100                1105                1110

Asp Lys  Ala Thr Lys Val Val  Asp Tyr Phe Lys His  Val Ser Leu
    1115                1120                1125

Val Glu  Thr Glu Gly Val Phe  Thr Leu Leu Asp Asp  Lys Ile Met
    1130                1135                1140

Met Pro  Gln Asp Asp Leu Val  Ile Ser Glu Ile Asp  Phe Asn Asn
    1145                1150                1155

Asn Ser  Ile Val Leu Gly Lys  Cys Glu Ile Trp Arg  Met Glu Gly
    1160                1165                1170

Gly Ser  Gly His Thr Val Thr  Asp Asp Ile Asp His  Phe Phe Ser
    1175                1180                1185

Ala Pro  Ser Ile Thr Tyr Arg  Glu Pro His Leu Ser  Ile Tyr Asp
    1190                1195                1200

Val Leu  Glu Val Gln Lys Glu  Glu Leu Asp Leu Ser  Lys Asp Leu
    1205                1210                1215

Met Val  Leu Pro Asn Ala Pro  Asn Arg Val Phe Ala  Trp Glu Thr
    1220                1225                1230

Gly Trp  Thr Pro Gly Leu Arg  Ser Leu Glu Asn Asp  Gly Thr Lys
    1235                1240                1245

Leu Leu  Asp Arg Ile Arg Asp  Asn Tyr Glu Gly Glu  Phe Tyr Trp
    1250                1255                1260

Arg Tyr  Phe Ala Phe Ile Ala  Asp Ala Leu Ile Thr  Thr Leu Lys
    1265                1270                1275

Pro Arg  Tyr Glu Asp Thr Asn  Ile Arg Ile Asn Leu  Asp Ser Asn
    1280                1285                1290

Thr Arg  Ser Phe Ile Val Pro  Ile Ile Thr Thr Glu  Tyr Ile Arg
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1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile Leu
1370 1375 1380

Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro

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1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys Thr
1535 1540 1545

Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Arg Lys Gly Asn Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe
1580 1585 1590

Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr

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1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu

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1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Tyr Lys Tyr Tyr Phe Asn Ser Asp Gly Val
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr

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2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr

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2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 363
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 363

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

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Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Ala Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270
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Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Gly Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480
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Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Gln Met Ala Ser Leu Ala Thr Phe Asp Asp Ala Arg Ala Lys Val
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545                 550                 555                 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
            580                 585                 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Ile Leu Phe Gln
        595                 600                 605

Lys Asn Ile Glu Asn Ser Glu Val Ala Tyr Tyr Tyr Asn Pro Gly Asp
    610                 615                 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Arg Ile Pro Ser Ile Ile Ser
625                 630                 635                 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
                645                 650                 655

Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser Thr
            660                 665                 670

Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Ser Lys
        675                 680                 685
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Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
690 695 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705 710 715 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
725 730 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Asn Glu Gly Arg Arg Glu
740 745 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
755 760 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
770 775 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785 790 795 800

Gln Glu Ile Arg Asn Asn Ser Asn Leu Ser Asp Ile Glu Leu Glu Glu
805 810 815

Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
820 825 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
835 840 845

Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser Ile
850 855 860

Ser Asp Ser Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Asp Asp Ser
865 870 875 880

His Phe Ile Ser Phe Glu Asp Ile Ser Lys Thr Glu Asp Gly Phe Ser
885 890 895

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Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Glu Ile Phe Ser Glu Tyr Ala Asn His Ile Arg Gly Glu Ile
        915                 920                 925

Ser Asn Ile Lys Asp Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Ala Ile His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Gly Tyr Ser Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Val  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050

Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
    1055                1060                1065

Asn Leu  Thr Ala Ala Thr Thr  Ala Ile Ile Thr Ser  Ser Leu Gly
    1070                1075                1080

Val Ala  Ser Gly Phe Ser Ile  Leu Leu Val Pro Leu  Ala Gly Ile
    1085                1090                1095
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```
Ser Ala  Gly Ile Pro Ser Leu  Val Asn Asn Glu Leu  Val Leu Arg
    1100                1105                1110

Asp Lys  Ala Thr Lys Val Val  Asp Tyr Phe Lys His  Ile Ser Leu
    1115                1120                1125

Val Glu  Thr Glu Gly Ala Phe  Thr Leu Leu Asp Asp  Lys Ile Met
    1130                1135                1140

Ile Pro  Gln Asp Asp Leu Val  Ile Ser Glu Ile Asp  Phe Asn Asn
    1145                1150                1155

Asn Ser  Ile Val Leu Gly Lys  Cys Glu Ile Trp Arg  Met Glu Gly
    1160                1165                1170

Gly Ser  Gly His Thr Val Thr  Asn Asp Ile Asp His  Phe Phe Ser
    1175                1180                1185

Ser Pro  Thr Ile Thr Tyr Ile  Lys Pro His Leu Ser  Ile Tyr Asp
    1190                1195                1200

Val Leu  Glu Val Gln Lys Glu  Glu Leu Asp Leu Ser  Lys Asp Leu
    1205                1210                1215

Met Val  Leu Pro Asn Ala Pro  Asn Arg Val Phe Ala  Trp Glu Thr
    1220                1225                1230

Gly Trp  Thr Pro Gly Leu Arg  Ser Leu Glu Asn Glu  Gly Thr Lys
    1235                1240                1245

Leu Leu  Asp Arg Ile Arg Asp  His Tyr Lys Gly Glu  Phe Tyr Trp
    1250                1255                1260

Arg Tyr  Phe Ala Phe Ile Ala  Asp Ala Leu Ile Thr  Thr Leu Lys
    1265                1270                1275

Pro Arg  Tyr Glu Asp Thr Asn  Ile Arg Ile Asn Leu  Asp Ser Asn
    1280                1285                1290
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Asn Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu His Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe His Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Asp Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Asp Asn Lys Ile Ile Leu
1370 1375 1380

Asn His His Glu Ile Asn Phe Ser Gly Asp Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Ile Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

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```
Asp Val  Val Leu Ile Ser Lys  Val Tyr Met Asp Asp  Ser Lys Pro
    1490                 1495                 1500

Ser Phe  Gly Tyr Tyr Ser Asn  Asn Leu Lys Asp Val  Lys Val Ile
    1505                 1510                 1515

Thr Lys  Asp Asn Val Asn Ile  Leu Thr Gly Tyr Tyr  Leu Lys Asp
    1520                 1525                 1530

Asp Ile  Lys Ile Ser Leu Ser  Phe Thr Leu Gln Asp  Glu Lys Thr
    1535                 1540                 1545

Ile Lys  Leu Asn Gly Val His  Leu Asp Glu Ser Gly  Val Ala Glu
    1550                 1555                 1560

Ile Leu  Lys Phe Met Asn Lys  Lys Gly Ser Thr Asn  Thr Ser Asp
    1565                 1570                 1575

Ser Leu  Met Ser Phe Leu Glu  Ser Val Asn Ile Lys  Ser Ile Phe
    1580                 1585                 1590

Val Asn  Phe Leu Gln Ser Lys  Ile Asn Phe Ile Leu  Asp Ala Asn
    1595                 1600                 1605

Phe Ile  Ile Ser Gly Thr Thr  Ser Ile Gly Gln Phe  Glu Phe Ile
    1610                 1615                 1620

Cys Asp  Glu Asn Asp Asn Ile  Gln Pro Tyr Phe Ile  Lys Phe Asn
    1625                 1630                 1635

Thr Leu  Glu Thr Thr Tyr Thr  Leu Tyr Val Gly Asn  Arg Gln Asn
    1640                 1645                 1650

Met Ile  Val Glu Pro Asn Tyr  Asp Leu Asp Asp Ser  Gly Asp Ile
    1655                 1660                 1665

Ser Ser  Thr Val Ile Asn Phe  Ser Gln Lys Tyr Leu  Tyr Gly Ile
    1670                 1675                 1680
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```
Asp Ser  Cys Val Asn Lys Val  Val Ile Ser Pro Asn  Ile Tyr Thr
    1685                1690                1695

Asp Glu  Ile Asn Ile Thr Pro  Val Tyr Glu Thr Asn  Asn Asn Tyr
    1700                1705                1710

Pro Glu  Val Ile Val Leu Asp  Ala Asn Tyr Ile Asn  Glu Lys Ile
    1715                1720                1725

Asn Val  Asn Ile Asn Asp Leu  Ser Ile Arg Tyr Val  Trp Ser Asn
    1730                1735                1740

Asp Gly  Asn Asp Phe Ile Leu  Met Ser Thr Ser Glu  Glu Asn Lys
    1745                1750                1755

Val Ser  Gln Val Lys Ile Arg  Phe Val Asn Val Phe  Lys Asp Lys
    1760                1765                1770

Thr Leu  Ala Asn Lys Leu Ser  Phe Asn Phe Ser Asp  Lys Gln Asp
    1775                1780                1785

Val Pro  Val Ser Glu Ile Ile  Ser Ala Phe Thr Pro  Ser Tyr Tyr
    1790                1795                1800

Glu Asp  Gly Leu Ile Gly Tyr  Asp Leu Gly Leu Val  Ser Leu Tyr
    1805                1810                1815

Asn Glu  Lys Phe Tyr Ile Asn  Asn Phe Gly Met Met  Val Ser Gly
    1820                1825                1830

Leu Ile  Tyr Ile Asn Asp Ser  Leu Tyr Tyr Phe Lys  Pro Pro Val
    1835                1840                1845

Asn Asn  Leu Ile Thr Gly Phe  Val Thr Val Gly Asp  Asp Lys Tyr
    1850                1855                1860

Tyr Phe  Asn Pro Thr Asn Gly  Gly Ala Ala Ser Ile  Gly Glu Thr
    1865                1870                1875
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Ile Ile Asn Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Ile Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Leu Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Glu
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met Tyr Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Ile
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Lys Lys Tyr Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Ile Glu Ile Asp Gly
2000 2005 2010

Lys Tyr Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Ser Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Ala Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Tyr Ser Phe Thr
2060 2065 2070

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Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Val Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asn Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Glu Lys Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Glu Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Asp Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Ile Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Asn Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asp Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

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Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Gln
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 364
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 364

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1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys

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    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Ala Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
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260 265 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Ala Met
275 280 285

Leu Pro Gly Ile Gln Pro Gly Leu Phe Glu Ser Ile Glu Lys Pro Ser
290 295 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu

```
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Gln Met Ala Ser Leu Ala Thr Phe Asp Asp Ala Arg Ala Lys Val
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545                 550                 555                 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
            580                 585                 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Ile Leu Phe Gln
        595                 600                 605

Lys Asn Ile Glu Asn Ser Glu Val Ala Tyr Tyr Tyr Asn Pro Gly Asp
    610                 615                 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Arg Ile Pro Ser Ile Ile Ser
625                 630                 635                 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
                645                 650                 655

Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser Thr
            660                 665                 670

Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Ser Lys
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675 680 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
690 695 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705 710 715 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
725 730 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Asn Glu Gly Arg Arg Glu
740 745 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
755 760 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
770 775 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785 790 795 800

Gln Glu Ile Arg Asn Asn Ser Asn Leu Ser Asp Ile Glu Leu Glu Glu
805 810 815

Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
820 825 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
835 840 845

Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser Ile
850 855 860

Ser Asp Ser Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Asp Asp Ser
865 870 875 880

His Phe Ile Ser Phe Glu Asp Ile Ser Lys Thr Glu Asp Gly Phe Ser

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885 890 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
900 905 910

Glu Lys Glu Ile Phe Ser Glu Tyr Ala Asn His Ile Arg Gly Glu Ile
915 920 925

Ser Asn Ile Lys Asp Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
930 935 940

Lys Lys Val Asn Leu Asp Ala Ile His Glu Val Asn Thr Leu Asn Ala
945 950 955 960

Ala Phe Phe Ile Gln Ser Leu Ile Gly Tyr Ser Ser Ser Lys Glu Ser
965 970 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
980 985 990

Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp Ala Ala Lys Val Val Glu
995 1000 1005

Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu Pro Thr
1010 1015 1020

Leu Ser Glu Gly Leu Pro Val Ile Ala Thr Ile Ile Asp Gly Val
1025 1030 1035

Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp Pro
1040 1045 1050

Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala Val
1055 1060 1065

Asn Leu Thr Ala Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu Gly
1070 1075 1080

Val Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile

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1085 1090 1095

Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg
1100 1105 1110

Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Ile Ser Leu
1115 1120 1125

Val Glu Thr Glu Gly Ala Phe Thr Leu Leu Asp Asp Lys Ile Met
1130 1135 1140

Ile Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asn Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ser Pro Thr Ile Thr Tyr Ile Lys Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Glu Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp His Tyr Lys Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn

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1280 1285 1290

Asn Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu His Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe His Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Asp Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Asp Asn Lys Ile Ile Leu
1370 1375 1380

Asn His His Glu Ile Asn Phe Ser Gly Asp Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Ile Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro

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1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Phe Thr Leu Gln Asp Glu Lys Thr
1535 1540 1545

Ile Lys Leu Asn Gly Val His Leu Asp Glu Ser Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Lys Lys Gly Ser Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Val Asn Ile Lys Ser Ile Phe
1580 1585 1590

Val Asn Phe Leu Gln Ser Lys Ile Asn Phe Ile Leu Asp Ala Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Thr Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile

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1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Asn Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Ser Ala Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Thr Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr

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1865 1870 1875

Ile Ile Asn Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Ile Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Leu Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Glu
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met Tyr Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Ile
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Lys Lys Tyr Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Ile Glu Ile Asp Gly
2000 2005 2010

Lys Tyr Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Ser Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Ala Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Tyr Ser Phe Thr

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2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Val Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asn Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Glu Lys Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Glu Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Asp Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Ile Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Asn Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asp Tyr Tyr Phe Asn Glu Asn Gly

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2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Gln
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

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<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 365

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

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Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Ala Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
130 135 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145 150 155 160

Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
165 170 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
180 185 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
195 200 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
210 215 220

Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val Arg
225 230 235 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu Gln
245 250 255

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Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460
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```
Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Gln Met Ala Ser Leu Ala Thr Phe Asp Asp Ala Arg Ala Lys Val
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545                 550                 555                 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
            580                 585                 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Ile Leu Phe Gln
        595                 600                 605

Lys Asn Ile Glu Asn Ser Glu Val Ala Tyr Tyr Tyr Asn Pro Gly Asp
    610                 615                 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Arg Ile Pro Ser Ile Ile Ser
625                 630                 635                 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
                645                 650                 655

Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser Thr
            660                 665                 670
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```
Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Ser Lys
        675                 680                 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
    690                 695                 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705                 710                 715                 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
                725                 730                 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Asn Glu Gly Arg Arg Glu
            740                 745                 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
        755                 760                 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
    770                 775                 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785                 790                 795                 800

Gln Glu Ile Arg Asn Asn Ser Asn Leu Ser Asp Ile Glu Leu Glu Glu
                805                 810                 815

Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
            820                 825                 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
        835                 840                 845

Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser Ile
    850                 855                 860

Ser Asp Ser Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Asp Asp Ser
865                 870                 875                 880
```

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```
His Phe Ile Ser Phe Glu Asp Ile Ser Lys Thr Glu Asp Gly Phe Ser
                885                 890                 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Glu Ile Phe Ser Glu Tyr Ala Asn His Ile Arg Arg Glu Ile
        915                 920                 925

Ser Asn Ile Lys Asp Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Ala Ile His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Gly Tyr Ser Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Val  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050

Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
    1055                1060                1065

Asn Leu  Thr Ala Ala Thr Thr  Ala Ile Ile Thr Ser  Ser Leu Gly
    1070                1075                1080
```

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Ile Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile
1085 1090 1095

Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg
1100 1105 1110

Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Ile Ser Leu
1115 1120 1125

Val Glu Thr Glu Gly Ala Phe Thr Leu Leu Asp Asp Lys Ile Met
1130 1135 1140

Ile Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asn Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ser Pro Thr Ile Thr Tyr Ile Lys Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Glu Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp His Tyr Lys Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

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Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Asn Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu His Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe His Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Asp Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Asp Asn Lys Ile Ile Leu
1370 1375 1380

Asn His His Glu Ile Asn Phe Ser Gly Asp Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Ile Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

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```
Ile Asn  Gly Ser Thr Lys Glu  Gly Leu Phe Val Ser  Glu Leu Pro
    1475                1480                1485

Asp Val  Val Leu Ile Ser Lys  Val Tyr Met Asp Asp  Ser Lys Pro
    1490                1495                1500

Ser Phe  Gly Tyr Tyr Ser Asn  Asn Leu Lys Asp Val  Lys Val Ile
    1505                1510                1515

Thr Lys  Asp Asn Val Asn Ile  Leu Thr Gly Tyr Tyr  Leu Lys Asp
    1520                1525                1530

Asp Ile  Lys Ile Ser Leu Ser  Phe Thr Leu Gln Asp  Glu Lys Thr
    1535                1540                1545

Ile Lys  Leu Asn Gly Val His  Leu Asp Glu Ser Gly  Val Ala Glu
    1550                1555                1560

Ile Leu  Lys Phe Met Asn Lys  Lys Gly Ser Thr Asn  Thr Ser Asp
    1565                1570                1575

Ser Leu  Met Ser Phe Leu Glu  Ser Val Asn Ile Lys  Ser Ile Phe
    1580                1585                1590

Val Asn  Phe Leu Gln Ser Lys  Ile Asn Phe Ile Leu  Asp Ala Asn
    1595                1600                1605

Phe Ile  Ile Ser Gly Thr Thr  Ser Ile Gly Gln Phe  Glu Phe Ile
    1610                1615                1620

Cys Asp  Glu Asn Asp Asn Ile  Gln Pro Tyr Phe Ile  Lys Phe Asn
    1625                1630                1635

Thr Leu  Glu Thr Thr Tyr Thr  Leu Tyr Val Gly Asn  Arg Gln Asn
    1640                1645                1650

Met Ile  Val Glu Pro Asn Tyr  Asp Leu Asp Asp Ser  Gly Asp Ile
    1655                1660                1665
```

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```
Ser Ser  Thr Val Ile Asn Phe  Ser Gln Lys Tyr Leu  Tyr Gly Ile
    1670                1675                1680

Asp Ser  Cys Val Asn Lys Val  Val Ile Ser Pro Asn  Ile Tyr Thr
    1685                1690                1695

Asp Glu  Ile Asn Ile Thr Pro  Val Tyr Glu Thr Asn  Asn Asn Tyr
    1700                1705                1710

Pro Glu  Val Ile Val Leu Asp  Ala Asn Tyr Ile Asn  Glu Lys Ile
    1715                1720                1725

Asn Val  Asn Ile Asn Asp Leu  Ser Ile Arg Tyr Val  Trp Ser Asn
    1730                1735                1740

Asp Gly  Asn Asp Phe Ile Leu  Met Ser Thr Ser Glu  Glu Asn Lys
    1745                1750                1755

Val Ser  Gln Val Lys Ile Arg  Phe Val Asn Val Phe  Lys Asp Lys
    1760                1765                1770

Thr Leu  Ala Asn Lys Leu Ser  Phe Asn Phe Ser Asp  Lys Gln Asp
    1775                1780                1785

Val Pro  Val Ser Glu Ile Ile  Ser Ala Phe Thr Pro  Ser Tyr Tyr
    1790                1795                1800

Glu Asp  Gly Leu Ile Gly Tyr  Asp Leu Gly Leu Val  Ser Leu Tyr
    1805                1810                1815

Asn Glu  Lys Phe Tyr Ile Asn  Asn Phe Gly Met Met  Val Ser Gly
    1820                1825                1830

Leu Ile  Tyr Ile Asn Asp Ser  Leu Tyr Tyr Phe Lys  Pro Pro Val
    1835                1840                1845

Asn Asn  Leu Ile Thr Gly Phe  Val Thr Val Gly Asp  Asp Lys Tyr
    1850                1855                1860
```

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```
Tyr Phe  Asn Pro Thr Asn Gly  Gly Ala Ala Ser Ile  Gly Glu Thr
    1865                1870                1875

Ile Ile  Asn Asp Lys Asn Tyr  Tyr Phe Asn Gln Ser  Gly Ile Leu
    1880                1885                1890

Gln Thr  Gly Val Phe Ser Thr  Glu Asp Gly Leu Lys  Tyr Phe Ala
    1895                1900                1905

Pro Ala  Asn Thr Leu Asp Glu  Asn Leu Glu Gly Glu  Ala Ile Asp
    1910                1915                1920

Phe Thr  Gly Lys Leu Ile Ile  Asp Glu Asn Ile Tyr  Tyr Phe Glu
    1925                1930                1935

Asp Asn  Tyr Arg Gly Ala Val  Glu Trp Lys Glu Leu  Asp Gly Glu
    1940                1945                1950

Met Tyr  Tyr Phe Ser Pro Glu  Thr Gly Lys Ala Phe  Lys Gly Leu
    1955                1960                1965

Asn Gln  Ile Gly Asp Asp Lys  Tyr Tyr Phe Asn Ser  Asp Gly Ile
    1970                1975                1980

Met Gln  Lys Gly Phe Val Ser  Ile Asn Asp Lys Lys  Tyr Tyr Phe
    1985                1990                1995

Asp Asp  Ser Gly Val Met Lys  Val Gly Tyr Ile Glu  Ile Asp Gly
    2000                2005                2010

Lys Tyr  Phe Tyr Phe Ala Glu  Asn Gly Glu Met Gln  Ile Gly Val
    2015                2020                2025

Phe Asn  Thr Ser Asp Gly Phe  Lys Tyr Phe Ala His  His Asn Glu
    2030                2035                2040

Asp Leu  Gly Asn Glu Glu Gly  Glu Ala Ile Ser Tyr  Ser Gly Ile
    2045                2050                2055
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```
Leu Asn  Phe Asn Asn Lys Ile  Tyr Tyr Phe Asp Tyr  Ser Phe Thr
    2060                 2065                 2070

Ala Val  Val Gly Trp Lys Asp  Leu Glu Asp Gly Ser  Lys Tyr Tyr
    2075                 2080                 2085

Phe Asp  Glu Asp Thr Ala Glu  Ala Tyr Val Gly Leu  Ser Leu Ile
    2090                 2095                 2100

Asn Asp  Gly Gln Tyr Tyr Phe  Asn Asp Asp Gly Ile  Met Gln Val
    2105                 2110                 2115

Gly Phe  Val Thr Ile Asn Asn  Lys Val Phe Tyr Phe  Ser Asp Ser
    2120                 2125                 2130

Gly Ile  Ile Glu Ser Gly Val  Gln Asn Ile Asp Asp  Asn Tyr Phe
    2135                 2140                 2145

Tyr Ile  Asp Glu Lys Gly Ile  Val Gln Ile Gly Val  Phe Asp Thr
    2150                 2155                 2160

Ser Asp  Glu Tyr Lys Tyr Phe  Ala Pro Ala Asn Thr  Val Asn Asp
    2165                 2170                 2175

Asn Ile  Tyr Gly Gln Ala Val  Asp Tyr Ser Gly Leu  Val Arg Val
    2180                 2185                 2190

Gly Glu  Asp Ile Tyr Tyr Phe  Gly Glu Thr Tyr Thr  Ile Glu Thr
    2195                 2200                 2205

Gly Trp  Ile Tyr Asp Met Glu  Asn Glu Ser Asp Lys  Tyr Tyr Phe
    2210                 2215                 2220

Asn Pro  Glu Thr Lys Lys Ala  Cys Lys Gly Ile Asn  Leu Ile Asp
    2225                 2230                 2235

Asp Ile  Lys Tyr Tyr Phe Asp  Glu Asn Gly Ile Met  Arg Thr Gly
    2240                 2245                 2250
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Leu Ile Ser Phe Glu Asn Asn Asp Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Gln
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

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<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 366

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu

```
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Ala Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu Gln
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245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
260 265 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Ala Met
275 280 285

Leu Pro Gly Ile Gln Pro Gly Leu Phe Glu Ser Ile Glu Lys Pro Ser
290 295 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr

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450 455 460

Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Gln Met Ala Ser Leu Ala Thr Phe Asp Asp Ala Arg Ala Lys Val
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
530 535 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545 550 555 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
565 570 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
580 585 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Ile Leu Phe Gln
595 600 605

Lys Asn Ile Glu Asn Ser Glu Val Ala Tyr Tyr Tyr Asn Pro Gly Asp
610 615 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Arg Ile Pro Ser Ile Ile Ser
625 630 635 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
645 650 655

Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser Thr

660 665 670

Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Ser Lys
675 680 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
690 695 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705 710 715 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
725 730 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Asn Glu Gly Arg Arg Glu
740 745 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
755 760 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
770 775 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785 790 795 800

Gln Glu Ile Arg Asn Asn Ser Asn Leu Ser Asp Ile Glu Leu Glu Glu
805 810 815

Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
820 825 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
835 840 845

Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser Ile
850 855 860

Ser Asp Ser Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Asp Asp Ser

865 870 875 880

His Phe Ile Ser Phe Glu Asp Ile Ser Lys Thr Glu Asp Gly Phe Ser
885 890 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
900 905 910

Glu Lys Glu Ile Phe Ser Glu Tyr Ala Asn His Ile Arg Gly Glu Ile
915 920 925

Ser Asn Ile Lys Asp Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
930 935 940

Lys Lys Val Asn Leu Asp Ala Ile His Glu Val Asn Thr Leu Asn Ala
945 950 955 960

Ala Phe Phe Ile Gln Ser Leu Ile Gly Tyr Ser Ser Ser Lys Glu Ser
965 970 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
980 985 990

Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp Ala Ala Lys Val Val Glu
995 1000 1005

Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu Pro Thr
1010 1015 1020

Leu Ser Glu Gly Leu Pro Val Ile Ala Thr Ile Ile Asp Gly Val
1025 1030 1035

Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp Pro
1040 1045 1050

Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala Val
1055 1060 1065

Asn Leu Thr Ala Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu Gly

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1070 1075 1080

Val Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile
1085 1090 1095

Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg
1100 1105 1110

Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Ile Ser Leu
1115 1120 1125

Val Glu Thr Glu Gly Ala Phe Thr Leu Leu Asp Asp Lys Ile Met
1130 1135 1140

Ile Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asn Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ser Pro Thr Ile Thr Tyr Ile Lys Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Glu Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp His Tyr Lys Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys

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1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Asn Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu His Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe His Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Asp Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Asp Asn Lys Ile Ile Leu
1370 1375 1380

Asn His His Glu Ile Asn Phe Ser Gly Asp Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Ile Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe

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1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Phe Thr Leu Gln Asp Glu Lys Thr
1535 1540 1545

Ile Lys Leu Asn Gly Val His Leu Asp Glu Ser Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Lys Lys Gly Ser Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Val Asn Ile Lys Ser Ile Phe
1580 1585 1590

Val Asn Phe Leu Gln Ser Lys Ile Asn Phe Ile Leu Asp Ala Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Thr Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile

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1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Asn Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Ser Ala Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr

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1850 1855 1860

Tyr Phe Asn Pro Thr Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asn Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Ile Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Leu Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Glu
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met Tyr Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Ile
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Lys Lys Tyr Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Ile Glu Ile Asp Gly
2000 2005 2010

Lys Tyr Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Ser Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Ala Ile Ser Tyr Ser Gly Ile

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2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Tyr Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Val Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asn Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Glu Lys Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Glu Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Asp Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Ile Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Asn Gly Ile Met Arg Thr Gly

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2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asp Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Gln
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

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<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

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Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
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Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

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```
Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Ala Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240
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Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445
```

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Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Gln Met Ala Ser Leu Ala Thr Phe Asp Asp Ala Arg Ala Lys Val
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
530 535 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545 550 555 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
565 570 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
580 585 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Ile Leu Phe Gln
595 600 605

Lys Asn Ile Glu Asn Ser Glu Val Ala Tyr Tyr Tyr Asn Pro Gly Asp
610 615 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Arg Ile Pro Ser Ile Ile Ser
625 630 635 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
645 650 655

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```
Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser Thr
            660                 665                 670

Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Ser Lys
        675                 680                 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
    690                 695                 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705                 710                 715                 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
                725                 730                 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Asn Glu Gly Arg Arg Glu
            740                 745                 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
        755                 760                 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
    770                 775                 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785                 790                 795                 800

Gln Glu Ile Arg Asn Asn Ser Asn Leu Ser Asp Ile Glu Leu Glu Glu
                805                 810                 815

Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
            820                 825                 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
        835                 840                 845

Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser Ile
    850                 855                 860
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```
Ser Asp Ser Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Asp Asp Ser
865                 870                 875                 880

His Phe Ile Ser Phe Glu Asp Ile Ser Lys Thr Glu Asp Gly Phe Ser
                885                 890                 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Glu Ile Phe Ser Glu Tyr Ala Asn His Ile Arg Arg Glu Ile
        915                 920                 925

Ser Asn Ile Lys Asp Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Ala Ile His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Gly Tyr Ser Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Val  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050

Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
    1055                1060                1065
```

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Asn Leu Thr Ala Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu Gly
1070 1075 1080

Ile Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile
1085 1090 1095

Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg
1100 1105 1110

Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Ile Ser Leu
1115 1120 1125

Val Glu Thr Glu Gly Ala Phe Thr Leu Leu Asp Asp Lys Ile Met
1130 1135 1140

Ile Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asn Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ser Pro Thr Ile Thr Tyr Ile Lys Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Glu Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp His Tyr Lys Gly Glu Phe Tyr Trp
1250 1255 1260

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Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Asn Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu His Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe His Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Asp Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Asp Asn Lys Ile Ile Leu
1370 1375 1380

Asn His His Glu Ile Asn Phe Ser Gly Asp Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Ile Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

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```
Ile Pro  Tyr Ser Phe Val Asp  Ser Glu Gly Lys Glu  Asn Gly Phe
    1460                1465                1470

Ile Asn  Gly Ser Thr Lys Glu  Gly Leu Phe Val Ser  Glu Leu Pro
    1475                1480                1485

Asp Val  Val Leu Ile Ser Lys  Val Tyr Met Asp Asp  Ser Lys Pro
    1490                1495                1500

Ser Phe  Gly Tyr Tyr Ser Asn  Asn Leu Lys Asp Val  Lys Val Ile
    1505                1510                1515

Thr Lys  Asp Asn Val Asn Ile  Leu Thr Gly Tyr Tyr  Leu Lys Asp
    1520                1525                1530

Asp Ile  Lys Ile Ser Leu Ser  Phe Thr Leu Gln Asp  Glu Lys Thr
    1535                1540                1545

Ile Lys  Leu Asn Gly Val His  Leu Asp Glu Ser Gly  Val Ala Glu
    1550                1555                1560

Ile Leu  Lys Phe Met Asn Lys  Lys Gly Ser Thr Asn  Thr Ser Asp
    1565                1570                1575

Ser Leu  Met Ser Phe Leu Glu  Ser Val Asn Ile Lys  Ser Ile Phe
    1580                1585                1590

Val Asn  Phe Leu Gln Ser Lys  Ile Asn Phe Ile Leu  Asp Ala Asn
    1595                1600                1605

Phe Ile  Ile Ser Gly Thr Thr  Ser Ile Gly Gln Phe  Glu Phe Ile
    1610                1615                1620

Cys Asp  Glu Asn Asp Asn Ile  Gln Pro Tyr Phe Ile  Lys Phe Asn
    1625                1630                1635

Thr Leu  Glu Thr Thr Tyr Thr  Leu Tyr Val Gly Asn  Arg Gln Asn
    1640                1645                1650
```

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```
Met Ile  Val Glu Pro Asn Tyr  Asp Leu Asp Asp Ser  Gly Asp Ile
    1655                1660                1665

Ser Ser  Thr Val Ile Asn Phe  Ser Gln Lys Tyr Leu  Tyr Gly Ile
    1670                1675                1680

Asp Ser  Cys Val Asn Lys Val  Val Ile Ser Pro Asn  Ile Tyr Thr
    1685                1690                1695

Asp Glu  Ile Asn Ile Thr Pro  Val Tyr Glu Thr Asn  Asn Asn Tyr
    1700                1705                1710

Pro Glu  Val Ile Val Leu Asp  Ala Asn Tyr Ile Asn  Glu Lys Ile
    1715                1720                1725

Asn Val  Asn Ile Asn Asp Leu  Ser Ile Arg Tyr Val  Trp Ser Asn
    1730                1735                1740

Asp Gly  Asn Asp Phe Ile Leu  Met Ser Thr Ser Glu  Glu Asn Lys
    1745                1750                1755

Val Ser  Gln Val Lys Ile Arg  Phe Val Asn Val Phe  Lys Asp Lys
    1760                1765                1770

Thr Leu  Ala Asn Lys Leu Ser  Phe Asn Phe Ser Asp  Lys Gln Asp
    1775                1780                1785

Val Pro  Val Ser Glu Ile Ile  Ser Ala Phe Thr Pro  Ser Tyr Tyr
    1790                1795                1800

Glu Asp  Gly Leu Ile Gly Tyr  Asp Leu Gly Leu Val  Ser Leu Tyr
    1805                1810                1815

Asn Glu  Lys Phe Tyr Ile Asn  Asn Phe Gly Met Met  Val Ser Gly
    1820                1825                1830

Leu Ile  Tyr Ile Asn Asp Ser  Leu Tyr Tyr Phe Lys  Pro Pro Val
    1835                1840                1845
```

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```
Asn Asn  Leu Ile Thr Gly Phe  Val Thr Val Gly Asp  Asp Lys Tyr
    1850                1855                1860

Tyr Phe  Asn Pro Thr Asn Gly  Gly Ala Ala Ser Ile  Gly Glu Thr
    1865                1870                1875

Ile Ile  Asn Asp Lys Asn Tyr  Tyr Phe Asn Gln Ser  Gly Ile Leu
    1880                1885                1890

Gln Thr  Gly Val Phe Ser Thr  Glu Asp Gly Leu Lys  Tyr Phe Ala
    1895                1900                1905

Pro Ala  Asn Thr Leu Asp Glu  Asn Leu Glu Gly Glu  Ala Ile Asp
    1910                1915                1920

Phe Thr  Gly Lys Leu Ile Ile  Asp Glu Asn Ile Tyr  Tyr Phe Glu
    1925                1930                1935

Asp Asn  Tyr Arg Gly Ala Val  Glu Trp Lys Glu Leu  Asp Gly Glu
    1940                1945                1950

Met Tyr  Tyr Phe Ser Pro Glu  Thr Gly Lys Ala Phe  Lys Gly Leu
    1955                1960                1965

Asn Gln  Ile Gly Asp Asp Lys  Tyr Tyr Phe Asn Ser  Asp Gly Ile
    1970                1975                1980

Met Gln  Lys Gly Phe Val Ser  Ile Asn Asp Lys Lys  Tyr Tyr Phe
    1985                1990                1995

Asp Asp  Ser Gly Val Met Lys  Val Gly Tyr Ile Glu  Ile Asp Gly
    2000                2005                2010

Lys Tyr  Phe Tyr Phe Ala Glu  Asn Gly Glu Met Gln  Ile Gly Val
    2015                2020                2025

Phe Asn  Thr Ser Asp Gly Phe  Lys Tyr Phe Ala His  His Asn Glu
    2030                2035                2040
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```
Asp Leu  Gly Asn Glu Glu Gly  Glu Ala Ile Ser Tyr  Ser Gly Ile
    2045                2050                2055

Leu Asn  Phe Asn Asn Lys Ile  Tyr Tyr Phe Asp Tyr  Ser Phe Thr
    2060                2065                2070

Ala Val  Val Gly Trp Lys Asp  Leu Glu Asp Gly Ser  Lys Tyr Tyr
    2075                2080                2085

Phe Asp  Glu Asp Thr Ala Glu  Ala Tyr Val Gly Leu  Ser Leu Ile
    2090                2095                2100

Asn Asp  Gly Gln Tyr Tyr Phe  Asn Asp Asp Gly Ile  Met Gln Val
    2105                2110                2115

Gly Phe  Val Thr Ile Asn Asn  Lys Val Phe Tyr Phe  Ser Asp Ser
    2120                2125                2130

Gly Ile  Ile Glu Ser Gly Val  Gln Asn Ile Asp Asp  Asn Tyr Phe
    2135                2140                2145

Tyr Ile  Asp Glu Lys Gly Ile  Val Gln Ile Gly Val  Phe Asp Thr
    2150                2155                2160

Ser Asp  Glu Tyr Lys Tyr Phe  Ala Pro Ala Asn Thr  Val Asn Asp
    2165                2170                2175

Asn Ile  Tyr Gly Gln Ala Val  Asp Tyr Ser Gly Leu  Val Arg Val
    2180                2185                2190

Gly Glu  Asp Ile Tyr Tyr Phe  Gly Glu Thr Tyr Thr  Ile Glu Thr
    2195                2200                2205

Gly Trp  Ile Tyr Asp Met Glu  Asn Glu Ser Asp Lys  Tyr Tyr Phe
    2210                2215                2220

Asn Pro  Glu Thr Lys Lys Ala  Cys Lys Gly Ile Asn  Leu Ile Asp
    2225                2230                2235
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Asp Ile Lys Tyr Tyr Phe Asp Glu Asn Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asp Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Gln
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

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Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu

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            20                  25                  30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Ala Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val Arg
```

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225 230 235 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu Gln
245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
260 265 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Ala Met
275 280 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
290 295 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu

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435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Gln Met Ala Ser Leu Ala Thr Phe Asp Asp Ala Arg Ala Lys Val
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
530 535 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545 550 555 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
565 570 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
580 585 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Ile Leu Phe Gln
595 600 605

Lys Asn Ile Glu Asn Ser Glu Val Ala Tyr Tyr Tyr Asn Pro Gly Asp
610 615 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Arg Ile Pro Ser Ile Ile Ser
625 630 635 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu

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645 650 655

Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser Thr
660 665 670

Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Ser Lys
675 680 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
690 695 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705 710 715 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
725 730 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Asn Glu Gly Arg Arg Glu
740 745 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
755 760 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
770 775 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785 790 795 800

Gln Glu Ile Arg Asn Asn Ser Asn Leu Ser Asp Ile Glu Leu Glu Glu
805 810 815

Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
820 825 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
835 840 845

Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser Ile

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    850                 855                 860

Ser Asp Ser Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Asp Asp Ser
865                 870                 875                 880

His Phe Ile Ser Phe Glu Asp Ile Ser Lys Thr Glu Asp Gly Phe Ser
                885                 890                 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Glu Ile Phe Ser Glu Tyr Ala Asn His Ile Arg Arg Glu Ile
        915                 920                 925

Ser Asn Ile Lys Asp Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Ala Ile His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Gly Tyr Ser Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Val  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050

Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
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1055 1060 1065

Asn Leu Thr Ala Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu Gly
1070 1075 1080

Ile Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile
1085 1090 1095

Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg
1100 1105 1110

Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Ile Ser Leu
1115 1120 1125

Val Glu Thr Glu Gly Ala Phe Thr Leu Leu Asp Asp Lys Ile Met
1130 1135 1140

Ile Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asn Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ser Pro Thr Ile Thr Tyr Ile Lys Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Glu Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp His Tyr Lys Gly Glu Phe Tyr Trp

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1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Asn Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu His Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe His Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Asp Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Asp Asn Lys Ile Ile Leu
1370 1375 1380

Asn His His Glu Ile Asn Phe Ser Gly Asp Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Ile Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn

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1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Phe Thr Leu Gln Asp Glu Lys Thr
1535 1540 1545

Ile Lys Leu Asn Gly Val His Leu Asp Glu Ser Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Lys Lys Gly Ser Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Val Asn Ile Lys Ser Ile Phe
1580 1585 1590

Val Asn Phe Leu Gln Ser Lys Ile Asn Phe Ile Leu Asp Ala Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Thr Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn

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1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Asn Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Ser Ala Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val

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1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Thr Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asn Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Ile Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Leu Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Glu
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met Tyr Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Ile
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Lys Lys Tyr Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Ile Glu Ile Asp Gly
2000 2005 2010

Lys Tyr Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Ser Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu

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2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Ala Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Tyr Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Val Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asn Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Glu Lys Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Glu Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Asp Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Ile Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp

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2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Asn Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asp Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Gln
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 369
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 369

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

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Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
            20                  25                  30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Ala Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220
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Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430
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Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Gln Met Ala Ser Leu Ala Thr Phe Asp Asp Ala Arg Ala Lys Val
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
530 535 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545 550 555 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
565 570 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
580 585 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Ile Leu Phe Gln
595 600 605

Lys Asn Ile Glu Asn Ser Glu Val Ala Tyr Tyr Tyr Asn Pro Gly Asp
610 615 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Arg Ile Pro Ser Ile Ile Ser
625 630 635 640

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```
Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
                645                 650                 655

Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser Thr
            660                 665                 670

Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Ser Lys
        675                 680                 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
    690                 695                 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705                 710                 715                 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
                725                 730                 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Asn Glu Gly Arg Arg Glu
            740                 745                 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
        755                 760                 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
    770                 775                 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785                 790                 795                 800

Gln Glu Ile Arg Asn Asn Ser Asn Leu Ser Asp Ile Glu Leu Glu Glu
                805                 810                 815

Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
            820                 825                 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
        835                 840                 845
```

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```
Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser Ile
    850                 855                 860

Ser Asp Ser Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Asp Asp Ser
865                 870                 875                 880

His Phe Ile Ser Phe Glu Asp Ile Ser Lys Thr Glu Asp Gly Phe Ser
                885                 890                 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Glu Ile Phe Ser Glu Tyr Ala Asn His Ile Glu Arg Glu Ile
        915                 920                 925

Ser Asn Ile Lys Asp Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Ala Ile His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Gly Tyr Ser Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Val  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050
```

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```
Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
    1055                1060                1065

Asn Leu  Thr Ala Ala Thr Thr  Ala Ile Ile Thr Ser  Ser Leu Gly
    1070                1075                1080

Ile Ala  Ser Gly Phe Ser Ile  Leu Leu Val Pro Leu  Ala Gly Ile
    1085                1090                1095

Ser Ala  Gly Ile Pro Ser Leu  Val Asn Asn Glu Leu  Val Leu Arg
    1100                1105                1110

Asp Lys  Ala Thr Lys Val Val  Asp Tyr Phe Lys His  Ile Ser Leu
    1115                1120                1125

Val Glu  Thr Glu Gly Ala Phe  Thr Leu Leu Asp Asp  Lys Ile Met
    1130                1135                1140

Ile Pro  Gln Asp Asp Leu Val  Ile Ser Glu Ile Asp  Phe Asn Asn
    1145                1150                1155

Asn Ser  Ile Val Leu Gly Lys  Cys Glu Ile Trp Arg  Met Glu Gly
    1160                1165                1170

Gly Ser  Gly His Thr Val Thr  Asn Asp Ile Asp His  Phe Phe Ser
    1175                1180                1185

Ser Pro  Thr Ile Thr Tyr Ile  Lys Pro His Leu Ser  Ile Tyr Asp
    1190                1195                1200

Val Leu  Glu Val Gln Lys Glu  Glu Leu Asp Leu Ser  Lys Asp Leu
    1205                1210                1215

Met Val  Leu Pro Asn Ala Pro  Asn Arg Val Phe Ala  Trp Glu Thr
    1220                1225                1230

Gly Trp  Thr Pro Gly Leu Arg  Ser Leu Glu Asn Glu  Gly Thr Lys
    1235                1240                1245
```

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```
Leu Leu  Asp Arg Ile Arg Asp  His Tyr Lys Gly Glu  Phe Tyr Trp
    1250                1255                1260

Arg Tyr  Phe Ala Phe Ile Ala  Asp Ala Leu Ile Thr  Thr Leu Lys
    1265                1270                1275

Pro Arg  Tyr Glu Asp Thr Asn  Ile Arg Ile Asn Leu  Asp Ser Asn
    1280                1285                1290

Asn Arg  Ser Phe Ile Val Pro  Ile Ile Thr Thr Glu  His Ile Arg
    1295                1300                1305

Glu Lys  Leu Ser Tyr Ser Phe  His Gly Ser Gly Gly  Thr Tyr Ala
    1310                1315                1320

Leu Ser  Leu Ser Gln Tyr Asn  Met Gly Ile Asn Ile  Glu Leu Ser
    1325                1330                1335

Glu Ser  Asp Val Trp Ile Ile  Asp Val Asp Asn Val  Val Arg Asp
    1340                1345                1350

Val Thr  Ile Asp Ser Asp Lys  Ile Lys Lys Gly Asp  Leu Ile Glu
    1355                1360                1365

Gly Ile  Leu Ser Thr Leu Ser  Ile Glu Asp Asn Lys  Ile Ile Leu
    1370                1375                1380

Asn His  His Glu Ile Asn Phe  Ser Gly Asp Val Asn  Gly Ser Asn
    1385                1390                1395

Gly Phe  Ile Ser Leu Thr Phe  Ser Ile Leu Glu Gly  Ile Asn Ala
    1400                1405                1410

Ile Ile  Glu Val Asp Leu Leu  Ser Lys Ser Tyr Lys  Leu Leu Ile
    1415                1420                1425

Ser Gly  Glu Leu Lys Ile Leu  Met Leu Asn Ser Asn  His Ile Gln
    1430                1435                1440
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Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Phe Thr Leu Gln Asp Glu Lys Thr
1535 1540 1545

Ile Lys Leu Asn Gly Val His Leu Asp Glu Ser Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Lys Lys Gly Ser Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Val Asn Ile Lys Ser Ile Phe
1580 1585 1590

Val Asn Phe Leu Gln Ser Lys Ile Asn Phe Ile Leu Asp Ala Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

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Thr Leu Glu Thr Thr Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Asn Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Ser Ala Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

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```
Leu Ile  Tyr Ile Asn Asp Ser  Leu Tyr Tyr Phe Lys  Pro Pro Val
    1835                 1840                 1845

Asn Asn  Leu Ile Thr Gly Phe  Val Thr Val Gly Asp  Asp Lys Tyr
    1850                 1855                 1860

Tyr Phe  Asn Pro Thr Asn Gly  Gly Ala Ala Ser Ile  Gly Glu Thr
    1865                 1870                 1875

Ile Ile  Asn Asp Lys Asn Tyr  Tyr Phe Asn Gln Ser  Gly Ile Leu
    1880                 1885                 1890

Gln Thr  Gly Val Phe Ser Thr  Glu Asp Gly Leu Lys  Tyr Phe Ala
    1895                 1900                 1905

Pro Ala  Asn Thr Leu Asp Glu  Asn Leu Glu Gly Glu  Ala Ile Asp
    1910                 1915                 1920

Phe Thr  Gly Lys Leu Ile Ile  Asp Glu Asn Ile Tyr  Tyr Phe Glu
    1925                 1930                 1935

Asp Asn  Tyr Arg Gly Ala Val  Glu Trp Lys Glu Leu  Asp Gly Glu
    1940                 1945                 1950

Met Tyr  Tyr Phe Ser Pro Glu  Thr Gly Lys Ala Phe  Lys Gly Leu
    1955                 1960                 1965

Asn Gln  Ile Gly Asp Asp Lys  Tyr Tyr Phe Asn Ser  Asp Gly Ile
    1970                 1975                 1980

Met Gln  Lys Gly Phe Val Ser  Ile Asn Asp Lys Lys  Tyr Tyr Phe
    1985                 1990                 1995

Asp Asp  Ser Gly Val Met Lys  Val Gly Tyr Ile Glu  Ile Asp Gly
    2000                 2005                 2010

Lys Tyr  Phe Tyr Phe Ala Glu  Asn Gly Glu Met Gln  Ile Gly Val
    2015                 2020                 2025
```

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Phe Asn Thr Ser Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Ala Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Tyr Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Val Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asn Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Glu Lys Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Glu Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Asp Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Ile Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

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Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Asn Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asp Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Gln
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 370
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 370

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe

```
1               5                   10                  15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
            20                  25                  30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Ala Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
```

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210 215 220

Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val Arg
225 230 235 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu Gln
245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
260 265 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Ala Met
275 280 285

Leu Pro Gly Ile Gln Pro Gly Leu Phe Glu Ser Ile Glu Lys Pro Ser
290 295 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp

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420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Gln Met Ala Ser Leu Ala Thr Phe Asp Asp Ala Arg Ala Lys Val
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
530 535 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545 550 555 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
565 570 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
580 585 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Ile Leu Phe Gln
595 600 605

Lys Asn Ile Glu Asn Ser Glu Val Ala Tyr Tyr Tyr Asn Pro Gly Asp
610 615 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Arg Ile Pro Ser Ile Ile Ser

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625 630 635 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
645 650 655

Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser Thr
660 665 670

Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Ser Lys
675 680 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
690 695 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705 710 715 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
725 730 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Asn Glu Gly Arg Arg Glu
740 745 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
755 760 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
770 775 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785 790 795 800

Gln Glu Ile Arg Asn Asn Ser Asn Leu Ser Asp Ile Glu Leu Glu Glu
805 810 815

Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
820 825 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser

835 840 845

Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser Ile
850 855 860

Ser Asp Ser Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Asp Asp Ser
865 870 875 880

His Phe Ile Ser Phe Glu Asp Ile Ser Lys Thr Glu Asp Gly Phe Ser
885 890 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
900 905 910

Glu Lys Glu Ile Phe Ser Glu Tyr Ala Asn His Ile Arg Gly Glu Ile
915 920 925

Ser Asn Ile Lys Asp Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
930 935 940

Lys Lys Val Asn Leu Asp Ala Ile His Glu Val Asn Thr Leu Asn Ala
945 950 955 960

Ala Phe Phe Ile Gln Ser Leu Ile Gly Tyr Ser Ser Ser Lys Glu Ser
965 970 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
980 985 990

Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp Ala Ala Lys Val Val Glu
995 1000 1005

Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu Pro Thr
1010 1015 1020

Leu Ser Glu Gly Leu Pro Val Ile Ala Thr Ile Ile Asp Gly Val
1025 1030 1035

Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp Pro

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1040 1045 1050

Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala Val
1055 1060 1065

Asn Leu Thr Ala Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu Gly
1070 1075 1080

Val Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile
1085 1090 1095

Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg
1100 1105 1110

Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Ile Ser Leu
1115 1120 1125

Val Glu Thr Glu Gly Ala Phe Thr Leu Leu Asp Asp Lys Ile Met
1130 1135 1140

Ile Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asn Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ser Pro Thr Ile Thr Tyr Ile Lys Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Glu Gly Thr Lys

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1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp His Tyr Lys Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Asn Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu His Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe His Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Asp Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Asp Asn Lys Ile Ile Leu
1370 1375 1380

Asn His His Glu Ile Asn Phe Ser Gly Asp Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Ile Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln

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1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Phe Thr Leu Gln Asp Glu Lys Thr
1535 1540 1545

Ile Lys Leu Asn Gly Val His Leu Asp Glu Ser Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Lys Lys Gly Ser Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Val Asn Ile Lys Ser Ile Phe
1580 1585 1590

Val Asn Phe Leu Gln Ser Lys Ile Asn Phe Ile Leu Asp Ala Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn

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1625 1630 1635

Thr Leu Glu Thr Thr Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Asn Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Ser Ala Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly

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1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Thr Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asn Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Ile Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Leu Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Glu
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met Tyr Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Ile
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Lys Lys Tyr Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Ile Glu Ile Asp Gly
2000 2005 2010

Lys Tyr Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val

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2015 2020 2025

Phe Asn Thr Ser Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Ala Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Tyr Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Val Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asn Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Glu Lys Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Glu Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Asp Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Ile Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe

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2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Asn Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asp Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Gln
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 371
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 371

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Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1               5                  10                  15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
            20                  25                  30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Ala Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
        195                 200                 205
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```
Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415
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```
Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Gln Met Ala Ser Leu Ala Thr Phe Asp Asp Ala Arg Ala Lys Val
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545                 550                 555                 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
            580                 585                 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Ile Leu Phe Gln
        595                 600                 605

Lys Asn Ile Glu Asn Ser Glu Val Ala Tyr Tyr Tyr Asn Pro Gly Asp
    610                 615                 620
```

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```
Gly Glu Ile Gln Glu Ile Asp Lys Tyr Arg Ile Pro Ser Ile Ile Ser
625                 630                 635                 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
                645                 650                 655

Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser Thr
            660                 665                 670

Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Ser Lys
        675                 680                 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
    690                 695                 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705                 710                 715                 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
                725                 730                 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Asn Glu Gly Arg Arg Glu
            740                 745                 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
        755                 760                 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
    770                 775                 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785                 790                 795                 800

Gln Glu Ile Arg Asn Asn Ser Asn Leu Ser Asp Ile Glu Leu Glu Glu
                805                 810                 815

Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
            820                 825                 830
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```
Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
        835                 840                 845

Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser Ile
    850                 855                 860

Ser Asp Ser Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Asp Asp Ser
865                 870                 875                 880

His Phe Ile Ser Phe Glu Asp Ile Ser Lys Thr Glu Asp Gly Phe Ser
                885                 890                 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Glu Ile Phe Ser Glu Tyr Ala Asn His Ile Arg Arg Glu Ile
        915                 920                 925

Ser Asn Ile Lys Asp Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Ala Ile His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Gly Tyr Ser Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Val  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035
```

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Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp Pro
1040 1045 1050

Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala Val
1055 1060 1065

Asn Leu Thr Ala Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu Gly
1070 1075 1080

Ile Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile
1085 1090 1095

Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg
1100 1105 1110

Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Ile Ser Leu
1115 1120 1125

Val Glu Thr Glu Gly Ala Phe Thr Leu Leu Asp Asp Lys Ile Met
1130 1135 1140

Ile Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asn Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ser Pro Thr Ile Thr Tyr Ile Lys Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

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Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Glu Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp His Tyr Lys Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Asn Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu His Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe His Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Asp Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Asp Asn Lys Ile Ile Leu
1370 1375 1380

Asn His His Glu Ile Asn Phe Ser Gly Asp Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Ile Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

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```
Ser Gly  Glu Leu Lys Ile Leu  Met Leu Asn Ser Asn  His Ile Gln
    1430                1435                1440

Gln Lys  Ile Asp Tyr Ile Gly  Phe Asn Ser Glu Leu  Gln Lys Asn
    1445                1450                1455

Ile Pro  Tyr Ser Phe Val Asp  Ser Glu Gly Lys Glu  Asn Gly Phe
    1460                1465                1470

Ile Asn  Gly Ser Thr Lys Glu  Gly Leu Phe Val Ser  Glu Leu Pro
    1475                1480                1485

Asp Val  Val Leu Ile Ser Lys  Val Tyr Met Asp Asp  Ser Lys Pro
    1490                1495                1500

Ser Phe  Gly Tyr Tyr Ser Asn  Asn Leu Lys Asp Val  Lys Val Ile
    1505                1510                1515

Thr Lys  Asp Asn Val Asn Ile  Leu Thr Gly Tyr Tyr  Leu Lys Asp
    1520                1525                1530

Asp Ile  Lys Ile Ser Leu Ser  Phe Thr Leu Gln Asp  Glu Lys Thr
    1535                1540                1545

Ile Lys  Leu Asn Gly Val His  Leu Asp Glu Ser Gly  Val Ala Glu
    1550                1555                1560

Ile Leu  Lys Phe Met Asn Lys  Lys Gly Ser Thr Asn  Thr Ser Asp
    1565                1570                1575

Ser Leu  Met Ser Phe Leu Glu  Ser Val Asn Ile Lys  Ser Ile Phe
    1580                1585                1590

Val Asn  Phe Leu Gln Ser Lys  Ile Asn Phe Ile Leu  Asp Ala Asn
    1595                1600                1605

Phe Ile  Ile Ser Gly Thr Thr  Ser Ile Gly Gln Phe  Glu Phe Ile
    1610                1615                1620
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```
Cys Asp  Glu Asn Asp Asn Ile  Gln Pro Tyr Phe Ile  Lys Phe Asn
    1625                1630                1635

Thr Leu  Glu Thr Thr Tyr Thr  Leu Tyr Val Gly Asn  Arg Gln Asn
    1640                1645                1650

Met Ile  Val Glu Pro Asn Tyr  Asp Leu Asp Asp Ser  Gly Asp Ile
    1655                1660                1665

Ser Ser  Thr Val Ile Asn Phe  Ser Gln Lys Tyr Leu  Tyr Gly Ile
    1670                1675                1680

Asp Ser  Cys Val Asn Lys Val  Val Ile Ser Pro Asn  Ile Tyr Thr
    1685                1690                1695

Asp Glu  Ile Asn Ile Thr Pro  Val Tyr Glu Thr Asn  Asn Asn Tyr
    1700                1705                1710

Pro Glu  Val Ile Val Leu Asp  Ala Asn Tyr Ile Asn  Glu Lys Ile
    1715                1720                1725

Asn Val  Asn Ile Asn Asp Leu  Ser Ile Arg Tyr Val  Trp Ser Asn
    1730                1735                1740

Asp Gly  Asn Asp Phe Ile Leu  Met Ser Thr Ser Glu  Glu Asn Lys
    1745                1750                1755

Val Ser  Gln Val Lys Ile Arg  Phe Val Asn Val Phe  Lys Asp Lys
    1760                1765                1770

Thr Leu  Ala Asn Lys Leu Ser  Phe Asn Phe Ser Asp  Lys Gln Asp
    1775                1780                1785

Val Pro  Val Ser Glu Ile Ile  Ser Ala Phe Thr Pro  Ser Tyr Tyr
    1790                1795                1800

Glu Asp  Gly Leu Ile Gly Tyr  Asp Leu Gly Leu Val  Ser Leu Tyr
    1805                1810                1815
```

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Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Thr Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asn Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Ile Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Leu Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Glu
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met Tyr Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Ile
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Lys Lys Tyr Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Ile Glu Ile Asp Gly
2000 2005 2010

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Lys Tyr Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Ser Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Ala Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Tyr Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Val Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asn Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Glu Lys Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Glu Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Asp Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Ile Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

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Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Asn Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asp Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Gln
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 372
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

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<400> 372

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Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1               5                  10                  15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
            20                  25                  30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Ile
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Ala Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
```

195 200 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
210 215 220

Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val Arg
225 230 235 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu Gln
245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
260 265 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Ala Met
275 280 285

Leu Pro Gly Ile Gln Pro Gly Leu Phe Glu Ser Ile Glu Lys Pro Ser
290 295 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala

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405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Gln Met Ala Ser Leu Ala Thr Phe Asp Asp Ala Arg Ala Lys Val
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
530 535 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545 550 555 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
565 570 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
580 585 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Ile Leu Phe Gln
595 600 605

Lys Asn Ile Glu Asn Ser Glu Val Ala Tyr Tyr Tyr Asn Pro Gly Asp

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610 615 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Arg Ile Pro Ser Ile Ile Ser
625 630 635 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
645 650 655

Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser Thr
660 665 670

Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Ser Lys
675 680 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
690 695 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705 710 715 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
725 730 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Asn Glu Gly Arg Arg Glu
740 745 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
755 760 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
770 775 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785 790 795 800

Gln Glu Ile Arg Asn Asn Ser Asn Leu Ser Asp Ile Glu Leu Glu Glu
805 810 815

Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp

820 825 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
835 840 845

Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser Ile
850 855 860

Ser Asp Ser Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Asp Asp Ser
865 870 875 880

His Phe Ile Ser Phe Glu Asp Ile Ser Lys Thr Glu Asp Gly Phe Ser
885 890 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
900 905 910

Glu Lys Glu Ile Phe Ser Glu Tyr Ala Asn His Ile Arg Gly Glu Ile
915 920 925

Ser Asn Ile Lys Asp Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
930 935 940

Lys Lys Val Asn Leu Asp Ala Ile His Glu Val Asn Thr Leu Asn Ala
945 950 955 960

Ala Phe Phe Ile Gln Ser Leu Ile Gly Tyr Ser Ser Ser Lys Glu Ser
965 970 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
980 985 990

Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp Ala Ala Lys Val Val Glu
995 1000 1005

Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu Pro Thr
1010 1015 1020

Leu Ser Glu Gly Leu Pro Val Ile Ala Thr Ile Ile Asp Gly Val

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1025 1030 1035

Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp Pro
1040 1045 1050

Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala Val
1055 1060 1065

Asn Leu Thr Ala Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu Gly
1070 1075 1080

Val Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile
1085 1090 1095

Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg
1100 1105 1110

Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Ile Ser Leu
1115 1120 1125

Val Glu Thr Glu Gly Ala Phe Thr Leu Leu Asp Asp Lys Ile Met
1130 1135 1140

Ile Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asn Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ser Pro Thr Ile Thr Tyr Ile Lys Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr

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1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Glu Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp His Tyr Lys Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Asn Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu His Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe His Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Asp Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Asp Asn Lys Ile Ile Leu
1370 1375 1380

Asn His His Glu Ile Asn Phe Ser Gly Asp Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Ile Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile

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1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Phe Thr Leu Gln Asp Glu Lys Thr
1535 1540 1545

Ile Lys Leu Asn Gly Val His Leu Asp Glu Ser Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Lys Lys Gly Ser Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Val Asn Ile Lys Ser Ile Phe
1580 1585 1590

Val Asn Phe Leu Gln Ser Lys Ile Asn Phe Ile Leu Asp Ala Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile

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1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Thr Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Asn Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Ser Ala Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr

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1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Thr Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asn Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Ile Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Leu Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Glu
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met Tyr Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Ile
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Lys Lys Tyr Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Ile Glu Ile Asp Gly

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2000 2005 2010

Lys Tyr Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Ser Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Ala Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Tyr Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Val Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asn Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Glu Lys Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Glu Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Asp Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Ile Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr

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2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Asn Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asp Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Gln
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 373
<211> 2365
<212> PRT
<213> Artificial Sequence

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<220>
<223> Synthetic amino acid sequence

<400> 373

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Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
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Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
            20                  25                  30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Ala Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190
```

```
Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400
```

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```
Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Gln Met Ala Ser Leu Ala Ser Phe Asp Asp Ala Arg Ala Lys Ala
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545                 550                 555                 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
            580                 585                 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
        595                 600                 605
```

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```
Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
    610                 615                 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625                 630                 635                 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
                645                 650                 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
            660                 665                 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
        675                 680                 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
    690                 695                 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705                 710                 715                 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
                725                 730                 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
            740                 745                 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
        755                 760                 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
    770                 775                 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785                 790                 795                 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
                805                 810                 815
```

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```
Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
            820                 825                 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
        835                 840                 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
    850                 855                 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865                 870                 875                 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
                885                 890                 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
        915                 920                 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020
```

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Leu Ser Glu Gly Leu Pro Ile Ile Ala Thr Ile Ile Asp Gly Val
1025 1030 1035

Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp Pro
1040 1045 1050

Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala Val
1055 1060 1065

Asn Leu Thr Thr Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu Gly
1070 1075 1080

Ile Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile
1085 1090 1095

Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg
1100 1105 1110

Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Val Ser Leu
1115 1120 1125

Val Glu Thr Glu Gly Val Phe Thr Leu Leu Asp Asp Lys Ile Met
1130 1135 1140

Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

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Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile Leu
1370 1375 1380

Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

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```
Ile Ile  Glu Val Asp Leu Leu  Ser Lys Ser Tyr Lys  Leu Leu Ile
    1415                1420                1425

Ser Gly  Glu Leu Lys Ile Leu  Met Leu Asn Ser Asn  His Ile Gln
    1430                1435                1440

Gln Lys  Ile Asp Tyr Ile Gly  Phe Asn Ser Glu Leu  Gln Lys Asn
    1445                1450                1455

Ile Pro  Tyr Ser Phe Val Asp  Ser Glu Gly Lys Glu  Asn Gly Phe
    1460                1465                1470

Ile Asn  Gly Ser Thr Lys Glu  Gly Leu Phe Val Ser  Glu Leu Pro
    1475                1480                1485

Asp Val  Val Leu Ile Ser Lys  Val Tyr Met Asp Asp  Ser Lys Pro
    1490                1495                1500

Ser Phe  Gly Tyr Tyr Ser Asn  Asn Leu Lys Asp Val  Lys Val Ile
    1505                1510                1515

Thr Lys  Asp Asn Val Asn Ile  Leu Thr Gly Tyr Tyr  Leu Lys Asp
    1520                1525                1530

Asp Ile  Lys Ile Ser Leu Ser  Leu Thr Leu Gln Asp  Glu Lys Thr
    1535                1540                1545

Ile Lys  Leu Asn Ser Val His  Leu Asp Glu Ser Gly  Val Ala Glu
    1550                1555                1560

Ile Leu  Lys Phe Met Asn Arg  Lys Gly Asn Thr Asn  Thr Ser Asp
    1565                1570                1575

Ser Leu  Met Ser Phe Leu Glu  Ser Met Asn Ile Lys  Ser Ile Phe
    1580                1585                1590

Val Asn  Phe Leu Gln Ser Asn  Ile Lys Phe Ile Leu  Asp Ala Asn
    1595                1600                1605
```

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Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

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Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Tyr Lys Tyr Tyr Phe Asn Ser Asp Gly Val
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe
1985 1990 1995

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Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

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Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 374
<211> 321
<212> PRT

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<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 374

```
Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr Phe
1               5                  10                  15

Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly
            20                  25                  30

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
        35                  40                  45

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
    50                  55                  60

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile
65                  70                  75                  80

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr
                85                  90                  95

Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
            100                 105                 110

Tyr Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys His Phe Tyr
        115                 120                 125

Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp
    130                 135                 140

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu
145                 150                 155                 160

Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn
                165                 170                 175

Ile Tyr Tyr Phe Gly Asn Asp Ser Lys Ala Ala Thr Gly Trp Ala Thr
```

```
            180                 185                 190

Ile Asp Gly Asn Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala
        195                 200                 205

Asn Gly Tyr Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly
    210                 215                 220

Leu Pro Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe
225                 230                 235                 240

Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg
                245                 250                 255

Tyr Gln Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly
            260                 265                 270

Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Ser Lys Val
        275                 280                 285

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
    290                 295                 300

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala
305                 310                 315                 320

Pro
```

<210> 375
<211> 321
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 375

```
Ile Ala Ser Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe
1               5                   10                  15
```

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```
Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly
            20                  25                  30

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
        35                  40                  45

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
    50                  55                  60

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile
65                  70                  75                  80

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr
                85                  90                  95

Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
            100                 105                 110

Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys His Phe Tyr
        115                 120                 125

Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp
    130                 135                 140

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu
145                 150                 155                 160

Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn
                165                 170                 175

Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr
            180                 185                 190

Ile Asp Gly Asn Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala
        195                 200                 205

Asn Gly Tyr Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly
    210                 215                 220
```

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Leu Pro Gln Ile Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe
225 230 235 240

Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg
245 250 255

Tyr Gln Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly
260 265 270

Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
275 280 285

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
290 295 300

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala
305 310 315 320

Pro

<210> 376
<211> 321
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 376

Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr Phe
1 5 10 15

Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly
20 25 30

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
35 40 45

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys

```
    50                  55                  60

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile
65                  70                  75                  80

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr
                85                  90                  95

Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
            100                 105                 110

Tyr Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys His Phe Tyr
        115                 120                 125

Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp
    130                 135                 140

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu
145                 150                 155                 160

Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn
                165                 170                 175

Ile Tyr Tyr Phe Gly Asn Asp Ser Lys Ala Ala Thr Gly Trp Ala Thr
            180                 185                 190

Ile Asp Gly Asn Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala
        195                 200                 205

Asn Gly Tyr Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly
    210                 215                 220

Leu Pro Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe
225                 230                 235                 240

Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg
                245                 250                 255

Tyr Gln Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly
```

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260 265 270

Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Ser Lys Val
275 280 285

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
290 295 300

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala
305 310 315 320

Pro

<210> 377
<211> 321
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 377

Ile Ala Ser Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe
1 5 10 15

Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly
20 25 30

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
35 40 45

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
50 55 60

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile
65 70 75 80

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr
85 90 95

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```
Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
            100                 105                 110

Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys His Phe Tyr
        115                 120                 125

Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp
    130                 135                 140

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu
145                 150                 155                 160

Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn
                165                 170                 175

Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr
            180                 185                 190

Ile Asp Gly Asn Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala
        195                 200                 205

Asn Gly Tyr Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly
    210                 215                 220

Leu Pro Gln Ile Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe
225                 230                 235                 240

Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg
                245                 250                 255

Tyr Gln Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly
            260                 265                 270

Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
        275                 280                 285

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
    290                 295                 300
```

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Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala
305 310 315 320

Pro

<210> 378
<211> 321
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 378

Ile Ala Ser Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe
1 5 10 15

Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly
20 25 30

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
35 40 45

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
50 55 60

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile
65 70 75 80

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr
85 90 95

Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
100 105 110

Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys His Phe Tyr
115 120 125

Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp

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130 135 140

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu
145 150 155 160

Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn
165 170 175

Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr
180 185 190

Ile Asp Gly Asn Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala
195 200 205

Asn Gly Tyr Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly
210 215 220

Leu Pro Gln Ile Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe
225 230 235 240

Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg
245 250 255

Tyr Gln Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly
260 265 270

Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
275 280 285

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
290 295 300

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala
305 310 315 320

Pro

<210> 379

17 Jun 2019
2013333532

<211> 321
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 379

```
Ile Ala Ser Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe
1               5                  10                  15

Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly
            20                  25                  30

Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly
        35                  40                  45

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
    50                  55                  60

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile
65                  70                  75                  80

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr
                85                  90                  95

Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
            100                 105                 110

Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys His Phe Tyr
        115                 120                 125

Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp
    130                 135                 140

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu
145                 150                 155                 160

Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn
                165                 170                 175
```

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Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr
180 185 190

Ile Asp Gly Asn Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala
195 200 205

Asn Gly Tyr Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly
210 215 220

Leu Pro Gln Ile Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe
225 230 235 240

Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg
245 250 255

Tyr Gln Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly
260 265 270

Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
275 280 285

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
290 295 300

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala
305 310 315 320

Pro

<210> 380
<211> 321
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 380

Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr Phe

```
1               5                   10                  15

Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly
            20                  25                  30

Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly
        35                  40                  45

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
    50                  55                  60

Tyr Tyr Phe Ala Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile
65                  70                  75                  80

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr
                85                  90                  95

Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
            100                 105                 110

Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Asp Lys His Phe Tyr
        115                 120                 125

Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp
    130                 135                 140

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu
145                 150                 155                 160

Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn
                165                 170                 175

Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr
            180                 185                 190

Ile Asp Gly Arg Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Ile Gly Ala
        195                 200                 205

Asn Gly Tyr Lys Ile Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly
```

210 215 220

Leu Pro Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe
225 230 235 240

Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg
245 250 255

Tyr Gln Asn Arg Phe Leu His Leu Leu Gly Asn Ile Tyr Tyr Phe Gly
260 265 270

Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Asn Met
275 280 285

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
290 295 300

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala
305 310 315 320

Pro

<210> 381
<211> 321
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 381

Ile Ala Ser Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe
1 5 10 15

Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly
20 25 30

Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly
35 40 45

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```
Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
    50                  55                  60

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile
65                  70                  75                  80

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr
                85                  90                  95

Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
            100                 105                 110

Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys His Phe Tyr
        115                 120                 125

Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp
    130                 135                 140

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu
145                 150                 155                 160

Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn
                165                 170                 175

Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr
            180                 185                 190

Ile Asp Gly Asn Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala
        195                 200                 205

Asn Gly Tyr Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly
    210                 215                 220

Leu Pro Gln Ile Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe
225                 230                 235                 240

Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg
                245                 250                 255
```

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Tyr Gln Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly
260 265 270

Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
275 280 285

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
290 295 300

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala
305 310 315 320

Pro

<210> 382
<211> 321
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 382

Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr Phe
1 5 10 15

Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly
20 25 30

Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly
35 40 45

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
50 55 60

Tyr Tyr Phe Ala Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile
65 70 75 80

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr

```
                85                  90                  95

Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
            100                 105                 110

Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Asp Lys His Phe Tyr
        115                 120                 125

Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp
    130                 135                 140

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu
145                 150                 155                 160

Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn
                165                 170                 175

Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr
            180                 185                 190

Ile Asp Gly Arg Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Ile Gly Ala
        195                 200                 205

Asn Gly Tyr Lys Ile Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly
    210                 215                 220

Leu Pro Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe
225                 230                 235                 240

Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg
                245                 250                 255

Tyr Gln Asn Arg Phe Leu His Leu Leu Gly Asn Ile Tyr Tyr Phe Gly
            260                 265                 270

Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Asn Met
        275                 280                 285

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
```

290 295 300

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala
305 310 315 320

Pro

<210> 383
<211> 321
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 383

Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr Phe
1 5 10 15

Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly
20 25 30

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
35 40 45

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
50 55 60

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile
65 70 75 80

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr
85 90 95

Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
100 105 110

Tyr Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys His Phe Tyr
115 120 125

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```
Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp
    130                 135                 140

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu
145                 150                 155                 160

Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn
                165                 170                 175

Ile Tyr Tyr Phe Gly Asn Asp Ser Lys Ala Ala Thr Gly Trp Ala Thr
            180                 185                 190

Ile Asp Gly Asn Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala
        195                 200                 205

Asn Gly Tyr Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly
    210                 215                 220

Leu Pro Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe
225                 230                 235                 240

Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg
                245                 250                 255

Tyr Gln Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly
            260                 265                 270

Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Ser Lys Val
        275                 280                 285

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
    290                 295                 300

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala
305                 310                 315                 320

Pro
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<210> 384
<211> 321
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 384

Ile Ala Ser Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe
1 5 10 15

Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly
20 25 30

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
35 40 45

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
50 55 60

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile
65 70 75 80

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr
85 90 95

Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
100 105 110

Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys His Phe Tyr
115 120 125

Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp
130 135 140

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu
145 150 155 160

Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn

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165 170 175

Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr
180 185 190

Ile Asp Gly Asn Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala
195 200 205

Asn Gly Tyr Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly
210 215 220

Leu Pro Gln Ile Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe
225 230 235 240

Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg
245 250 255

Tyr Gln Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly
260 265 270

Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
275 280 285

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
290 295 300

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala
305 310 315 320

Pro

<210> 385
<211> 321
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 385

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```
Ile Ala Ser Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe
1               5                   10                  15

Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly
            20                  25                  30

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
        35                  40                  45

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
    50                  55                  60

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile
65                  70                  75                  80

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr
                85                  90                  95

Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
            100                 105                 110

Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys His Phe Tyr
        115                 120                 125

Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp
    130                 135                 140

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu
145                 150                 155                 160

Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn
                165                 170                 175

Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr
            180                 185                 190

Ile Asp Gly Asn Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala
        195                 200                 205
```

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Asn Gly Tyr Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly
210 215 220

Leu Pro Gln Ile Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe
225 230 235 240

Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg
245 250 255

Tyr Gln Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly
260 265 270

Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
275 280 285

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
290 295 300

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala
305 310 315 320

Pro

<210> 386
<211> 321
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 386

Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr Phe
1 5 10 15

Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly
20 25 30

Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly

```
        35                  40                  45

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
    50                  55                  60

Tyr Tyr Phe Ala Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile
65                  70                  75                  80

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr
                85                  90                  95

Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
            100                 105                 110

Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Asp Lys His Phe Tyr
        115                 120                 125

Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp
    130                 135                 140

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu
145                 150                 155                 160

Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn
                165                 170                 175

Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr
            180                 185                 190

Ile Asp Gly Arg Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Ile Gly Ala
        195                 200                 205

Asn Gly Tyr Lys Ile Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly
    210                 215                 220

Leu Pro Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe
225                 230                 235                 240

Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg
```

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245 250 255

Tyr Gln Asn Arg Phe Leu His Leu Leu Gly Asn Ile Tyr Tyr Phe Gly
260 265 270

Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Asn Met
275 280 285

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
290 295 300

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala
305 310 315 320

Pro

<210> 387
<211> 321
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 387

Ile Ala Ser Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe
1 5 10 15

Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly
20 25 30

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
35 40 45

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
50 55 60

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile
65 70 75 80

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```
Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr
                85                  90                  95

Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
            100                 105                 110

Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys His Phe Tyr
        115                 120                 125

Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp
    130                 135                 140

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu
145                 150                 155                 160

Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn
                165                 170                 175

Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr
            180                 185                 190

Ile Asp Gly Asn Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala
        195                 200                 205

Asn Gly Tyr Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly
    210                 215                 220

Leu Pro Gln Ile Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe
225                 230                 235                 240

Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg
                245                 250                 255

Tyr Gln Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly
            260                 265                 270

Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
        275                 280                 285
```

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Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
290 295 300

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala
305 310 315 320

Pro

<210> 388
<211> 321
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 388

Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr Phe
1 5 10 15

Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly
20 25 30

Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly
35 40 45

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
50 55 60

Tyr Tyr Phe Ala Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile
65 70 75 80

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr
85 90 95

Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
100 105 110

Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Asp Lys His Phe Tyr

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115 120 125

Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp
130 135 140

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu
145 150 155 160

Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn
165 170 175

Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr
180 185 190

Ile Asp Gly Arg Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Ile Gly Ala
195 200 205

Asn Gly Tyr Lys Ile Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly
210 215 220

Leu Pro Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe
225 230 235 240

Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg
245 250 255

Tyr Gln Asn Arg Phe Leu His Leu Leu Gly Asn Ile Tyr Tyr Phe Gly
260 265 270

Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Asn Met
275 280 285

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
290 295 300

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala
305 310 315 320

Pro

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2013333532

<210> 389
<211> 321
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 389

```
Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr Phe
1               5                  10                  15

Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly
            20                  25                  30

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
        35                  40                  45

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
    50                  55                  60

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile
65                  70                  75                  80

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr
                85                  90                  95

Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
            100                 105                 110

Tyr Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys His Phe Tyr
        115                 120                 125

Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp
    130                 135                 140

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu
145                 150                 155                 160
```

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Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn
165 170 175

Ile Tyr Tyr Phe Gly Asn Asp Ser Lys Ala Ala Thr Gly Trp Ala Thr
180 185 190

Ile Asp Gly Asn Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala
195 200 205

Asn Gly Tyr Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly
210 215 220

Leu Pro Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe
225 230 235 240

Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg
245 250 255

Tyr Gln Asn Arg Phe Leu His Leu Leu Gly Asn Ile Tyr Tyr Phe Gly
260 265 270

Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
275 280 285

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
290 295 300

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala
305 310 315 320

Pro

<210> 390
<211> 321
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

17 Jun 2019
2013333532

<400> 390

```
Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr Phe
1               5                  10                  15

Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly
            20                  25                  30

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
        35                  40                  45

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
    50                  55                  60

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile
65                  70                  75                  80

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr
                85                  90                  95

Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
            100                 105                 110

Tyr Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys His Phe Tyr
        115                 120                 125

Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp
    130                 135                 140

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu
145                 150                 155                 160

Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn
                165                 170                 175

Ile Tyr Tyr Phe Gly Asn Asp Ser Lys Ala Ala Thr Gly Trp Ala Thr
            180                 185                 190

Ile Asp Gly Asn Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala
```

195 200 205

Asn Gly Tyr Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly
210 215 220

Leu Pro Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe
225 230 235 240

Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg
245 250 255

Tyr Gln Asn Arg Phe Leu His Leu Leu Gly Asn Ile Tyr Tyr Phe Gly
260 265 270

Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
275 280 285

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
290 295 300

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala
305 310 315 320

Pro

<210> 391
<211> 321
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 391

Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr Phe
1 5 10 15

Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly
20 25 30

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```
Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
        35                  40                  45

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
    50                  55                  60

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile
65                  70                  75                  80

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr
                85                  90                  95

Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
            100                 105                 110

Tyr Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys His Phe Tyr
        115                 120                 125

Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp
    130                 135                 140

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu
145                 150                 155                 160

Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn
                165                 170                 175

Ile Tyr Tyr Phe Gly Asn Asp Ser Lys Ala Ala Thr Gly Trp Ala Thr
            180                 185                 190

Ile Asp Gly Asn Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala
        195                 200                 205

Asn Gly Tyr Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly
    210                 215                 220

Leu Pro Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe
225                 230                 235                 240
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Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg
245 250 255

Tyr Gln Asn Arg Phe Leu His Leu Leu Gly Asn Ile Tyr Tyr Phe Gly
260 265 270

Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
275 280 285

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
290 295 300

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala
305 310 315 320

Pro

<210> 392
<211> 321
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 392

Ile Ala Ser Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe
1 5 10 15

Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly
20 25 30

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
35 40 45

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
50 55 60

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile

65 70 75 80

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr
85 90 95

Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
100 105 110

Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys His Phe Tyr
115 120 125

Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp
130 135 140

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu
145 150 155 160

Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn
165 170 175

Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr
180 185 190

Ile Asp Gly Asn Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala
195 200 205

Asn Gly Tyr Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly
210 215 220

Leu Pro Gln Ile Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe
225 230 235 240

Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg
245 250 255

Tyr Gln Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly
260 265 270

Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val

275 280 285

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
290 295 300

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala
305 310 315 320

Pro

<210> 393
<211> 321
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 393

Ile Ala Ser Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe
1 5 10 15

Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly
20 25 30

Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly
35 40 45

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
50 55 60

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile
65 70 75 80

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr
85 90 95

Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
100 105 110

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```
Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys His Phe Tyr
        115                 120                 125

Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp
    130                 135                 140

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu
145                 150                 155                 160

Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn
                165                 170                 175

Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr
            180                 185                 190

Ile Asp Gly Asn Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala
        195                 200                 205

Asn Gly Tyr Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly
    210                 215                 220

Leu Pro Gln Ile Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe
225                 230                 235                 240

Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg
                245                 250                 255

Tyr Gln Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly
            260                 265                 270

Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
        275                 280                 285

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
    290                 295                 300

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala
305                 310                 315                 320
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Pro

<210> 394
<211> 321
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 394

Ile Ala Ser Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe
1 5 10 15

Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly
20 25 30

Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly
35 40 45

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
50 55 60

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile
65 70 75 80

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr
85 90 95

Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
100 105 110

Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys His Phe Tyr
115 120 125

Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp
130 135 140

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu

145 150 155 160

Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn
165 170 175

Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr
180 185 190

Ile Asp Gly Asn Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala
195 200 205

Asn Gly Tyr Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly
210 215 220

Leu Pro Gln Ile Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe
225 230 235 240

Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg
245 250 255

Tyr Gln Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly
260 265 270

Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
275 280 285

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
290 295 300

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala
305 310 315 320

Pro

<210> 395
<211> 321
<212> PRT
<213> Artificial Sequence

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<220>
<223> Synthetic amino acid sequence

<400> 395

Ile Ala Ser Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe
1 5 10 15

Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly
20 25 30

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
35 40 45

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
50 55 60

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile
65 70 75 80

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr
85 90 95

Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
100 105 110

Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys His Phe Tyr
115 120 125

Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp
130 135 140

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu
145 150 155 160

Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn
165 170 175

Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr
180 185 190

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Ile Asp Gly Asn Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala
195 200 205

Asn Gly Tyr Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly
210 215 220

Leu Pro Gln Ile Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe
225 230 235 240

Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg
245 250 255

Tyr Gln Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly
260 265 270

Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
275 280 285

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
290 295 300

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala
305 310 315 320

Pro

<210> 396
<211> 321
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 396

Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr Phe
1 5 10 15

Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly

```
            20                  25                  30

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
        35                  40                  45

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
    50                  55                  60

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile
65                  70                  75                  80

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr
                85                  90                  95

Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
            100                 105                 110

Tyr Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys His Phe Tyr
        115                 120                 125

Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp
    130                 135                 140

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu
145                 150                 155                 160

Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn
                165                 170                 175

Ile Tyr Tyr Phe Gly Asn Asp Ser Lys Ala Ala Thr Gly Trp Ala Thr
            180                 185                 190

Ile Asp Gly Asn Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala
        195                 200                 205

Asn Gly Tyr Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly
    210                 215                 220

Leu Pro Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe
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225 230 235 240

Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg
245 250 255

Tyr Gln Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly
260 265 270

Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Ser Lys Val
275 280 285

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
290 295 300

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala
305 310 315 320

Pro

<210> 397
<211> 321
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 397

Ile Ala Ser Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe
1 5 10 15

Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly
20 25 30

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
35 40 45

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
50 55 60

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```
Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile
65                  70                  75                  80

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr
                85                  90                  95

Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
            100                 105                 110

Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys His Phe Tyr
        115                 120                 125

Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp
    130                 135                 140

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu
145                 150                 155                 160

Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn
                165                 170                 175

Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr
            180                 185                 190

Ile Asp Gly Asn Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala
        195                 200                 205

Asn Gly Tyr Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly
    210                 215                 220

Leu Pro Gln Ile Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe
225                 230                 235                 240

Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg
                245                 250                 255

Tyr Gln Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly
            260                 265                 270
```

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Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
275 280 285

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
290 295 300

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala
305 310 315 320

Pro

<210> 398
<211> 321
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 398

Ile Ala Ser Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe
1 5 10 15

Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly
20 25 30

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
35 40 45

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
50 55 60

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile
65 70 75 80

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr
85 90 95

Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr

100 105 110

Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys His Phe Tyr
115 120 125

Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp
130 135 140

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu
145 150 155 160

Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn
165 170 175

Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr
180 185 190

Ile Asp Gly Asn Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala
195 200 205

Asn Gly Tyr Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly
210 215 220

Leu Pro Gln Ile Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe
225 230 235 240

Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg
245 250 255

Tyr Gln Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly
260 265 270

Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
275 280 285

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
290 295 300

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala

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305 310 315 320

Pro

<210> 399
<211> 321
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 399

Ile Ala Ser Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe
1 5 10 15

Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly
20 25 30

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
35 40 45

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
50 55 60

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile
65 70 75 80

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr
85 90 95

Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
100 105 110

Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys His Phe Tyr
115 120 125

Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp
130 135 140

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Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu
145 150 155 160

Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn
165 170 175

Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr
180 185 190

Ile Asp Gly Asn Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala
195 200 205

Asn Gly Tyr Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly
210 215 220

Leu Pro Gln Ile Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe
225 230 235 240

Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg
245 250 255

Tyr Gln Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly
260 265 270

Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
275 280 285

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
290 295 300

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala
305 310 315 320

Pro

<210> 400
<211> 321
<212> PRT

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<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 400

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Ile Ala Ser Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe
1               5                  10                  15

Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly
            20                  25                  30

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
        35                  40                  45

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
    50                  55                  60

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile
65                  70                  75                  80

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr
                85                  90                  95

Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
            100                 105                 110

Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys His Phe Tyr
        115                 120                 125

Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp
    130                 135                 140

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu
145                 150                 155                 160

Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn
                165                 170                 175

Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr
```

```
            180                 185                 190

Ile Asp Gly Asn Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala
        195                 200                 205

Asn Gly Tyr Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly
    210                 215                 220

Leu Pro Gln Ile Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe
225                 230                 235                 240

Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg
                245                 250                 255

Tyr Gln Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly
            260                 265                 270

Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
        275                 280                 285

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
    290                 295                 300

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala
305                 310                 315                 320

Pro
```

<210> 401
<211> 321
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 401

```
Ile Ala Ser Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe
1               5                   10                  15
```

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```
Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly
            20                  25                  30

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
        35                  40                  45

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
    50                  55                  60

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile
65                  70                  75                  80

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr
                85                  90                  95

Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
            100                 105                 110

Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys His Phe Tyr
        115                 120                 125

Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp
    130                 135                 140

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu
145                 150                 155                 160

Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn
                165                 170                 175

Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr
            180                 185                 190

Ile Asp Gly Asn Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala
        195                 200                 205

Asn Gly Tyr Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly
    210                 215                 220
```

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Leu Pro Gln Ile Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe
225 230 235 240

Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg
245 250 255

Tyr Gln Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly
260 265 270

Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
275 280 285

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
290 295 300

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala
305 310 315 320

Pro

<210> 402
<211> 321
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 402

Ile Ala Ser Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe
1 5 10 15

Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly
20 25 30

Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly
35 40 45

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys

50 55 60

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile
65 70 75 80

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr
85 90 95

Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
100 105 110

Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys His Phe Tyr
115 120 125

Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp
130 135 140

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu
145 150 155 160

Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn
165 170 175

Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr
180 185 190

Ile Asp Gly Asn Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala
195 200 205

Asn Gly Tyr Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly
210 215 220

Leu Pro Gln Ile Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe
225 230 235 240

Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg
245 250 255

Tyr Gln Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly

260 265 270

Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
275 280 285

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
290 295 300

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala
305 310 315 320

Pro

<210> 403
<211> 321
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 403

Ile Ala Ser Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe
1 5 10 15

Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly
20 25 30

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
35 40 45

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
50 55 60

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile
65 70 75 80

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr
85 90 95

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```
Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
            100                 105                 110

Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys His Phe Tyr
        115                 120                 125

Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp
    130                 135                 140

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu
145                 150                 155                 160

Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn
                165                 170                 175

Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr
            180                 185                 190

Ile Asp Gly Asn Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala
        195                 200                 205

Asn Gly Tyr Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly
    210                 215                 220

Leu Pro Gln Ile Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe
225                 230                 235                 240

Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg
                245                 250                 255

Tyr Gln Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly
            260                 265                 270

Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
        275                 280                 285

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
    290                 295                 300
```

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Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala
305 310 315 320

Pro

<210> 404
<211> 321
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 404

Ile Ala Ser Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe
1 5 10 15

Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly
20 25 30

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
35 40 45

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
50 55 60

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile
65 70 75 80

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr
85 90 95

Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
100 105 110

Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys His Phe Tyr
115 120 125

Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp

```
    130                 135                 140

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu
145                 150                 155                 160

Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn
                165                 170                 175

Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr
            180                 185                 190

Ile Asp Gly Asn Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala
        195                 200                 205

Asn Gly Tyr Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly
    210                 215                 220

Leu Pro Gln Ile Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe
225                 230                 235                 240

Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg
                245                 250                 255

Tyr Gln Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly
            260                 265                 270

Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
        275                 280                 285

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
    290                 295                 300

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala
305                 310                 315                 320

Pro
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<210> 405

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<211> 321
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 405

```
Ile Ala Ser Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe
1               5                  10                  15

Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly
            20                  25                  30

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
        35                  40                  45

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
    50                  55                  60

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile
65                  70                  75                  80

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr
                85                  90                  95

Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
            100                 105                 110

Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys His Phe Tyr
        115                 120                 125

Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp
    130                 135                 140

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu
145                 150                 155                 160

Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn
                165                 170                 175
```

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Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr
180 185 190

Ile Asp Gly Asn Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala
195 200 205

Asn Gly Tyr Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly
210 215 220

Leu Pro Gln Ile Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe
225 230 235 240

Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg
245 250 255

Tyr Gln Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly
260 265 270

Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
275 280 285

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
290 295 300

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala
305 310 315 320

Pro

<210> 406
<211> 321
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 406

Ile Ala Ser Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe

```
1               5                   10                  15

Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly
            20                  25                  30

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
        35                  40                  45

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
    50                  55                  60

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile
65                  70                  75                  80

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr
                85                  90                  95

Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
            100                 105                 110

Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys His Phe Tyr
        115                 120                 125

Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp
    130                 135                 140

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu
145                 150                 155                 160

Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn
                165                 170                 175

Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr
            180                 185                 190

Ile Asp Gly Asn Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala
        195                 200                 205

Asn Gly Tyr Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly
```

210 215 220

Leu Pro Gln Ile Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe
225 230 235 240

Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg
245 250 255

Tyr Gln Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly
260 265 270

Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
275 280 285

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
290 295 300

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala
305 310 315 320

Pro

<210> 407
<211> 321
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 407

Ile Ala Ser Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe
1 5 10 15

Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly
20 25 30

Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly
35 40 45

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```
Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
    50                  55                  60

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile
65                  70                  75                  80

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr
                85                  90                  95

Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
            100                 105                 110

Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys His Phe Tyr
        115                 120                 125

Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp
    130                 135                 140

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu
145                 150                 155                 160

Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn
                165                 170                 175

Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr
            180                 185                 190

Ile Asp Gly Asn Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala
        195                 200                 205

Asn Gly Tyr Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly
    210                 215                 220

Leu Pro Gln Ile Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe
225                 230                 235                 240

Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg
                245                 250                 255
```

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Tyr Gln Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly
260 265 270

Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
275 280 285

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
290 295 300

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala
305 310 315 320

Pro

<210> 408
<211> 321
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 408

Ile Ala Ser Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe
1 5 10 15

Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly
20 25 30

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
35 40 45

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
50 55 60

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile
65 70 75 80

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr

```
                85                  90                  95

Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
            100                 105                 110

Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys His Phe Tyr
        115                 120                 125

Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp
    130                 135                 140

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu
145                 150                 155                 160

Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn
                165                 170                 175

Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr
            180                 185                 190

Ile Asp Gly Asn Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala
        195                 200                 205

Asn Gly Tyr Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly
    210                 215                 220

Leu Pro Gln Ile Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe
225                 230                 235                 240

Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg
                245                 250                 255

Tyr Gln Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly
            260                 265                 270

Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
        275                 280                 285

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
```

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290 295 300

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala
305 310 315 320

Pro

<210> 409
<211> 321
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 409

Ile Ala Ser Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe
1 5 10 15

Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly
20 25 30

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
35 40 45

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
50 55 60

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile
65 70 75 80

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr
85 90 95

Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
100 105 110

Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys His Phe Tyr
115 120 125

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```
Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp
    130                 135                 140

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu
145                 150                 155                 160

Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn
                165                 170                 175

Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr
            180                 185                 190

Ile Asp Gly Asn Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala
        195                 200                 205

Asn Gly Tyr Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly
    210                 215                 220

Leu Pro Gln Ile Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe
225                 230                 235                 240

Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg
                245                 250                 255

Tyr Gln Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly
            260                 265                 270

Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
        275                 280                 285

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
    290                 295                 300

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala
305                 310                 315                 320

Pro
```

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<210> 410
<211> 321
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 410

```
Ile Ala Ser Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe
1               5                   10                  15


Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly
            20                  25                  30


Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
        35                  40                  45


Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
    50                  55                  60


Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile
65                  70                  75                  80


Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr
                85                  90                  95


Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
            100                 105                 110


Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys His Phe Tyr
        115                 120                 125


Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp
    130                 135                 140


Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu
145                 150                 155                 160


Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn
```

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165 170 175

Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr
180 185 190

Ile Asp Gly Asn Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala
195 200 205

Asn Gly Tyr Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly
210 215 220

Leu Pro Gln Ile Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe
225 230 235 240

Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg
245 250 255

Tyr Gln Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly
260 265 270

Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
275 280 285

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
290 295 300

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala
305 310 315 320

Pro

<210> 411
<211> 321
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 411

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```
Ile Ala Ser Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe
1               5                   10                  15

Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly
            20                  25                  30

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
        35                  40                  45

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
    50                  55                  60

Tyr Tyr Phe Ala Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile
65                  70                  75                  80

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Ala Thr
                85                  90                  95

Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
            100                 105                 110

Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr
        115                 120                 125

Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp
    130                 135                 140

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu
145                 150                 155                 160

Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn
                165                 170                 175

Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr
            180                 185                 190

Ile Asp Gly Arg Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Ile Gly Ala
        195                 200                 205
```

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Asn Gly Tyr Lys Ile Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly
210 215 220

Leu Pro Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe
225 230 235 240

Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg
245 250 255

Tyr Gln Asn Arg Phe Leu His Leu Leu Gly Asn Ile Tyr Tyr Phe Gly
260 265 270

Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Asn Met
275 280 285

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
290 295 300

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala
305 310 315 320

Pro

<210> 412
<211> 321
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 412

Ile Ala Ser Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe
1 5 10 15

Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly
20 25 30

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly

```
        35                  40                  45

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
    50                  55                  60

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile
65                  70                  75                  80

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr
                85                  90                  95

Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
            100                 105                 110

Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys His Phe Tyr
        115                 120                 125

Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp
    130                 135                 140

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu
145                 150                 155                 160

Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn
                165                 170                 175

Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr
            180                 185                 190

Ile Asp Gly Asn Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala
        195                 200                 205

Asn Gly Tyr Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly
    210                 215                 220

Leu Pro Gln Ile Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe
225                 230                 235                 240

Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg
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245 250 255

Tyr Gln Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly
260 265 270

Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
275 280 285

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
290 295 300

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala
305 310 315 320

Pro

<210> 413
<211> 321
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 413

Ile Ala Ser Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe
1 5 10 15

Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly
20 25 30

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
35 40 45

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
50 55 60

Tyr Tyr Phe Ala Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile
65 70 75 80

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```
Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr
                85                  90                  95

Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
            100                 105                 110

Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr
        115                 120                 125

Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp
    130                 135                 140

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu
145                 150                 155                 160

Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn
                165                 170                 175

Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr
            180                 185                 190

Ile Asp Gly Arg Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Ile Gly Ala
        195                 200                 205

Asn Gly Tyr Lys Ile Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly
    210                 215                 220

Leu Pro Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe
225                 230                 235                 240

Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg
                245                 250                 255

Tyr Gln Asn Arg Phe Leu His Leu Leu Gly Asn Ile Tyr Tyr Phe Gly
            260                 265                 270

Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Asn Met
        275                 280                 285
```

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Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
290 295 300

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala
305 310 315 320

Pro

<210> 414
<211> 321
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 414

Ile Ala Ser Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe
1 5 10 15

Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly
20 25 30

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
35 40 45

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
50 55 60

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile
65 70 75 80

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr
85 90 95

Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
100 105 110

Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys His Phe Tyr

```
        115                 120                 125

Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp
    130                 135                 140

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu
145                 150                 155                 160

Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn
                165                 170                 175

Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr
            180                 185                 190

Ile Asp Gly Asn Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala
        195                 200                 205

Asn Gly Tyr Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly
    210                 215                 220

Leu Pro Gln Ile Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe
225                 230                 235                 240

Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg
                245                 250                 255

Tyr Gln Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly
            260                 265                 270

Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
        275                 280                 285

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
    290                 295                 300

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala
305                 310                 315                 320

Pro
```

17 Jun 2019
2013333532

<210> 415
<211> 321
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 415

```
Ile Ala Ser Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe
1               5                   10                  15

Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly
            20                  25                  30

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
        35                  40                  45

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
    50                  55                  60

Tyr Tyr Phe Ala Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile
65                  70                  75                  80

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr
                85                  90                  95

Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
            100                 105                 110

Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys His Phe Tyr
        115                 120                 125

Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp
    130                 135                 140

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu
145                 150                 155                 160
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Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn
165 170 175

Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr
180 185 190

Ile Asp Gly Arg Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Ile Gly Ala
195 200 205

Asn Gly Tyr Lys Ile Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly
210 215 220

Leu Pro Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe
225 230 235 240

Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg
245 250 255

Tyr Gln Asn Arg Phe Leu His Leu Leu Gly Asn Ile Tyr Tyr Phe Gly
260 265 270

Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Asn Met
275 280 285

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
290 295 300

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala
305 310 315 320

Pro

<210> 416
<211> 321
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

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<400> 416

Ile Ala Ser Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe
1 5 10 15

Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly
20 25 30

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
35 40 45

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
50 55 60

Tyr Tyr Phe Ala Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile
65 70 75 80

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr
85 90 95

Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
100 105 110

Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr
115 120 125

Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp
130 135 140

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu
145 150 155 160

Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn
165 170 175

Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr
180 185 190

Ile Asp Gly Arg Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Ile Gly Ala

195 200 205

Asn Gly Tyr Lys Ile Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly
210 215 220

Leu Pro Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe
225 230 235 240

Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg
245 250 255

Tyr Gln Asn Arg Phe Leu His Leu Leu Gly Asn Ile Tyr Tyr Phe Gly
260 265 270

Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Asn Met
275 280 285

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
290 295 300

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala
305 310 315 320

Pro

<210> 417
<211> 321
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 417

Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr Phe
1 5 10 15

Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly
20 25 30

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```
Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly
        35                  40                  45

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
    50                  55                  60

Tyr Tyr Phe Ala Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile
65                  70                  75                  80

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr
                85                  90                  95

Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
            100                 105                 110

Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Asp Lys His Phe Tyr
        115                 120                 125

Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp
    130                 135                 140

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu
145                 150                 155                 160

Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn
                165                 170                 175

Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr
            180                 185                 190

Ile Asp Gly Arg Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Ile Gly Ala
        195                 200                 205

Asn Gly Tyr Lys Ile Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly
    210                 215                 220

Leu Pro Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe
225                 230                 235                 240
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Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg
245 250 255

Tyr Gln Asn Arg Phe Leu His Leu Leu Gly Asn Ile Tyr Tyr Phe Gly
260 265 270

Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Asn Met
275 280 285

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
290 295 300

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala
305 310 315 320

Pro

<210> 418
<211> 321
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 418

Ile Ala Ser Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe
1 5 10 15

Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly
20 25 30

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
35 40 45

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
50 55 60

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile

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65 70 75 80

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr
85 90 95

Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
100 105 110

Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys His Phe Tyr
115 120 125

Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp
130 135 140

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu
145 150 155 160

Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn
165 170 175

Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr
180 185 190

Ile Asp Gly Asn Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala
195 200 205

Asn Gly Tyr Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly
210 215 220

Leu Pro Gln Ile Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe
225 230 235 240

Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg
245 250 255

Tyr Gln Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly
260 265 270

Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val

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275 280 285

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
290 295 300

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala
305 310 315 320

Pro

<210> 419
<211> 321
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 419

Ile Ala Ser Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe
1 5 10 15

Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly
20 25 30

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
35 40 45

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
50 55 60

Tyr Tyr Phe Ala Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile
65 70 75 80

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr
85 90 95

Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
100 105 110

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```
Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr
        115                 120                 125

Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp
    130                 135                 140

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu
145                 150                 155                 160

Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn
                165                 170                 175

Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr
            180                 185                 190

Ile Asp Gly Arg Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Ile Gly Ala
        195                 200                 205

Asn Gly Tyr Lys Ile Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly
    210                 215                 220

Leu Pro Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe
225                 230                 235                 240

Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg
                245                 250                 255

Tyr Gln Asn Arg Phe Leu His Leu Leu Gly Asn Ile Tyr Tyr Phe Gly
            260                 265                 270

Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Asn Met
        275                 280                 285

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
    290                 295                 300

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala
305                 310                 315                 320
```

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Pro

<210> 420
<211> 321
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 420

Ile Ala Ser Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe
1 5 10 15

Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly
20 25 30

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
35 40 45

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
50 55 60

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile
65 70 75 80

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr
85 90 95

Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
100 105 110

Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys His Phe Tyr
115 120 125

Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp
130 135 140

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu

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145 150 155 160

Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn
165 170 175

Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr
180 185 190

Ile Asp Gly Asn Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala
195 200 205

Asn Gly Tyr Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly
210 215 220

Leu Pro Gln Ile Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe
225 230 235 240

Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg
245 250 255

Tyr Gln Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly
260 265 270

Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
275 280 285

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
290 295 300

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala
305 310 315 320

Pro

<210> 421
<211> 321
<212> PRT
<213> Artificial Sequence

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<220>
<223> Synthetic amino acid sequence

<400> 421

Ile Ala Ser Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe
1 5 10 15

Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly
20 25 30

Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly
35 40 45

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
50 55 60

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile
65 70 75 80

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr
85 90 95

Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
100 105 110

Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys His Phe Tyr
115 120 125

Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp
130 135 140

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu
145 150 155 160

Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn
165 170 175

Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr
180 185 190

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Ile Asp Gly Asn Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala
195 200 205

Asn Gly Tyr Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly
210 215 220

Leu Pro Gln Ile Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe
225 230 235 240

Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg
245 250 255

Tyr Gln Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly
260 265 270

Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
275 280 285

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
290 295 300

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala
305 310 315 320

Pro

<210> 422
<211> 612
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 422

Phe Ile Leu Met Ser Thr Asp Glu Glu Asn Lys Val Ser Gln Val Lys
1 5 10 15

Ile Arg Phe Thr Asn Val Phe Lys Gly Asn Thr Ile Ser Asp Lys Ile

```
            20                  25                  30

Ser Phe Asn Phe Ser Asp Lys Gln Asp Val Ser Ile Asn Lys Val Ile
        35                  40                  45

Ser Thr Phe Thr Pro Ser Tyr Tyr Val Glu Gly Leu Leu Asn Tyr Asp
    50                  55                  60

Leu Gly Leu Ile Ser Leu Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe
65                  70                  75                  80

Gly Met Met Val Ser Gly Leu Val Tyr Ile Asn Asp Ser Leu Tyr Tyr
                85                  90                  95

Phe Lys Pro Pro Ile Lys Asn Leu Ile Thr Gly Phe Thr Thr Ile Gly
            100                 105                 110

Asp Asp Lys Tyr Tyr Phe Asn Pro Asp Asn Gly Gly Ala Ala Ser Val
        115                 120                 125

Gly Glu Thr Ile Ile Asp Gly Lys Asn Tyr Tyr Phe Ser Gln Asn Gly
    130                 135                 140

Val Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
145                 150                 155                 160

Ala Pro Ala Asp Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
                165                 170                 175

Phe Thr Gly Lys Leu Thr Ile Asp Glu Asn Val Tyr Tyr Phe Gly Asp
            180                 185                 190

Asn Tyr Arg Ala Ala Ile Glu Trp Gln Thr Leu Asp Asp Glu Val Tyr
        195                 200                 205

Tyr Phe Ser Thr Asp Thr Gly Arg Ala Phe Lys Gly Leu Asn Gln Ile
    210                 215                 220

Gly Asp Asp Lys Phe Tyr Phe Asn Ser Asp Gly Ile Met Gln Lys Gly
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225 230 235 240

Phe Val Asn Ile Asn Asp Lys Thr Phe Tyr Phe Asp Asp Ser Gly Val
245 250 255

Met Lys Ser Gly Tyr Thr Glu Ile Asp Gly Lys Tyr Phe Tyr Phe Ala
260 265 270

Glu Asn Gly Glu Met Gln Ile Gly Val Phe Asn Thr Ala Asp Gly Phe
275 280 285

Lys Tyr Phe Ala His His Asp Glu Asp Leu Gly Asn Glu Glu Gly Glu
290 295 300

Ala Leu Ser Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr
305 310 315 320

Phe Asp Asp Ser Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp
325 330 335

Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly
340 345 350

Ile Ser Ile Ile Asn Asp Gly Lys Tyr Tyr Phe Asn Asp Ser Gly Ile
355 360 365

Met Gln Ile Gly Phe Val Thr Ile Asn Asn Glu Val Phe Tyr Phe Ser
370 375 380

Asp Ser Gly Ile Val Glu Ser Gly Met Gln Asn Ile Asp Asp Asn Tyr
385 390 395 400

Phe Tyr Ile Asp Glu Asn Gly Leu Val Gln Ile Gly Val Phe Asp Thr
405 410 415

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn
420 425 430

Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val Gly Glu

435 440 445

Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile
450 455 460

Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asp Pro Glu Thr
465 470 475 480

Lys Lys Ala Tyr Lys Gly Ile Asn Val Ile Asp Asp Ile Lys Tyr Tyr
485 490 495

Phe Asp Glu Asn Gly Ile Met Arg Thr Gly Leu Ile Thr Phe Glu Asp
500 505 510

Asn His Tyr Tyr Phe Asn Glu Asp Gly Ile Met Gln Tyr Gly Tyr Leu
515 520 525

Asn Ile Glu Asp Lys Thr Phe Tyr Phe Ser Glu Asp Gly Ile Met Gln
530 535 540

Ile Gly Val Phe Asn Thr Pro Asp Gly Phe Lys Tyr Phe Ala His Gln
545 550 555 560

Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly
565 570 575

Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile
580 585 590

Ala Ala Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp
595 600 605

Pro Asp Thr Ala
610

<210> 423
<211> 612
<212> PRT
<213> Artificial Sequence

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<220>
<223> Synthetic amino acid sequence

<400> 423

```
Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys Val Ser Gln Val Lys
1               5                  10                  15

Ile Arg Phe Val Asn Val Phe Lys Asp Lys Thr Leu Ala Asn Lys Leu
            20                  25                  30

Ser Phe Asn Phe Ser Asp Lys Gln Asp Val Pro Val Ser Glu Ile Ile
        35                  40                  45

Leu Ser Phe Thr Pro Ser Tyr Tyr Glu Asp Gly Leu Ile Gly Tyr Asp
    50                  55                  60

Leu Gly Leu Val Ser Leu Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe
65                  70                  75                  80

Gly Met Met Val Ser Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr
                85                  90                  95

Phe Lys Pro Pro Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly
            100                 105                 110

Asp Asp Lys Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile
        115                 120                 125

Gly Glu Thr Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly
    130                 135                 140

Val Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
145                 150                 155                 160

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
                165                 170                 175

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp Asp
            180                 185                 190
```

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```
Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu Met His
        195                 200                 205

Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu Asn Gln Ile
    210                 215                 220

Gly Asp Tyr Lys Tyr Tyr Phe Asn Ser Asp Gly Val Met Gln Lys Gly
225                 230                 235                 240

Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe Asp Asp Ser Gly Val
                245                 250                 255

Met Lys Val Gly Tyr Thr Glu Ile Asp Gly Lys His Phe Tyr Phe Ala
            260                 265                 270

Glu Asn Gly Glu Met Gln Ile Gly Val Phe Asn Thr Glu Asp Gly Phe
        275                 280                 285

Lys Tyr Phe Ala His His Asn Glu Asp Leu Gly Asn Glu Glu Gly Glu
    290                 295                 300

Glu Ile Ser Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr
305                 310                 315                 320

Phe Asp Asp Ser Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp
                325                 330                 335

Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly
            340                 345                 350

Leu Ser Leu Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile
        355                 360                 365

Met Gln Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser
    370                 375                 380

Asp Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
385                 390                 395                 400
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Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
405 410 415

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn
420 425 430

Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val Gly Glu
435 440 445

Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile
450 455 460

Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asn Pro Glu Thr
465 470 475 480

Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp Asp Ile Lys Tyr Tyr
485 490 495

Phe Asp Glu Lys Gly Ile Met Arg Thr Gly Leu Ile Ser Phe Glu Asn
500 505 510

Asn Asn Tyr Tyr Phe Asn Glu Asn Gly Glu Met Gln Phe Gly Tyr Ile
515 520 525

Asn Ile Glu Asp Lys Met Phe Tyr Phe Gly Glu Asp Gly Val Met Gln
530 535 540

Ile Gly Val Phe Asn Thr Pro Asp Gly Phe Lys Tyr Phe Ala His Gln
545 550 555 560

Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly
565 570 575

Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile
580 585 590

Ala Ala Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp
595 600 605

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Pro Asp Thr Ala
610

<210> 424
<211> 612
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 424

Phe Ile Leu Met Ser Thr Asp Glu Glu Asn Lys Val Ser Gln Val Lys
1 5 10 15

Ile Arg Phe Thr Asn Val Phe Lys Gly Asn Thr Ile Ser Asp Lys Ile
20 25 30

Ser Phe Asn Phe Ser Asp Lys Gln Asp Val Ser Ile Asn Lys Val Ile
35 40 45

Ser Thr Phe Thr Pro Ser Tyr Tyr Val Glu Gly Leu Leu Asn Tyr Asp
50 55 60

Leu Gly Leu Ile Ser Leu Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe
65 70 75 80

Gly Met Met Val Ser Gly Leu Val Tyr Ile Asn Asp Ser Leu Tyr Tyr
85 90 95

Phe Lys Pro Pro Ile Lys Asn Leu Ile Thr Gly Phe Thr Thr Ile Gly
100 105 110

Asp Asp Lys Tyr Tyr Phe Asn Pro Asp Asn Gly Gly Ala Ala Ser Val
115 120 125

Gly Glu Thr Ile Ile Asp Gly Lys Asn Tyr Tyr Phe Ser Gln Asn Gly
130 135 140

Val Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe

```
145                 150                 155                 160

Ala Pro Ala Asp Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
                165                 170                 175

Phe Thr Gly Lys Leu Thr Ile Asp Glu Asn Val Tyr Tyr Phe Gly Asp
            180                 185                 190

Asn Tyr Arg Ala Ala Ile Glu Trp Gln Thr Leu Asp Asp Glu Val Tyr
        195                 200                 205

Tyr Phe Ser Thr Asp Thr Gly Arg Ala Phe Lys Gly Leu Asn Gln Ile
    210                 215                 220

Gly Asp Asp Lys Phe Tyr Phe Asn Ser Asp Gly Ile Met Gln Lys Gly
225                 230                 235                 240

Phe Val Asn Ile Asn Asp Lys Thr Phe Tyr Phe Asp Asp Ser Gly Val
                245                 250                 255

Met Lys Ser Gly Tyr Thr Glu Ile Asp Gly Lys Tyr Phe Tyr Phe Ala
            260                 265                 270

Glu Asn Gly Glu Met Gln Ile Gly Val Phe Asn Thr Ala Asp Gly Phe
        275                 280                 285

Lys Tyr Phe Ala His His Asp Glu Asp Leu Gly Asn Glu Glu Gly Glu
    290                 295                 300

Ala Leu Ser Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr
305                 310                 315                 320

Phe Asp Asp Ser Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp
                325                 330                 335

Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly
            340                 345                 350

Ile Ser Ile Ile Asn Asp Gly Lys Tyr Tyr Phe Asn Asp Ser Gly Ile
```

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355 360 365

Met Gln Ile Gly Phe Val Thr Ile Asn Asn Glu Val Phe Tyr Phe Ser
370 375 380

Asp Ser Gly Ile Val Glu Ser Gly Met Gln Asn Ile Asp Asp Asn Tyr
385 390 395 400

Phe Tyr Ile Asp Glu Asn Gly Leu Val Gln Ile Gly Val Phe Asp Thr
405 410 415

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn
420 425 430

Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val Gly Glu
435 440 445

Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile
450 455 460

Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asp Pro Glu Thr
465 470 475 480

Lys Lys Ala Tyr Lys Gly Ile Asn Val Ile Asp Asp Ile Lys Tyr Tyr
485 490 495

Phe Asp Glu Asn Gly Ile Met Arg Thr Gly Leu Ile Thr Phe Glu Asp
500 505 510

Asn His Tyr Tyr Phe Asn Glu Asp Gly Ile Met Gln Tyr Gly Tyr Leu
515 520 525

Asn Ile Glu Asp Lys Thr Phe Tyr Phe Ser Glu Asp Gly Ile Met Gln
530 535 540

Ile Gly Val Phe Asn Thr Pro Asp Gly Phe Lys Tyr Phe Ala His Gln
545 550 555 560

Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly

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565 570 575

Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile
580 585 590

Ala Ala Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp
595 600 605

Pro Asp Thr Ala
610

<210> 425
<211> 612
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 425

Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys Val Ser Gln Val Lys
1 5 10 15

Ile Arg Phe Val Asn Val Phe Lys Asp Lys Thr Leu Ala Asn Lys Leu
20 25 30

Ser Phe Asn Phe Ser Asp Lys Gln Asp Val Pro Val Ser Glu Ile Ile
35 40 45

Leu Ser Phe Thr Pro Ser Tyr Tyr Glu Asp Gly Leu Ile Gly Tyr Asp
50 55 60

Leu Gly Leu Val Ser Leu Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe
65 70 75 80

Gly Met Met Val Ser Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr
85 90 95

Phe Lys Pro Pro Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly
100 105 110

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```
Asp Asp Lys Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile
        115                 120                 125

Gly Glu Thr Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly
    130                 135                 140

Val Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
145                 150                 155                 160

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
                165                 170                 175

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp Asp
            180                 185                 190

Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu Met His
        195                 200                 205

Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu Asn Gln Ile
    210                 215                 220

Gly Asp Tyr Lys Tyr Tyr Phe Asn Ser Asp Gly Val Met Gln Lys Gly
225                 230                 235                 240

Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe Asp Asp Ser Gly Val
                245                 250                 255

Met Lys Val Gly Tyr Thr Glu Ile Asp Gly Lys His Phe Tyr Phe Ala
            260                 265                 270

Glu Asn Gly Glu Met Gln Ile Gly Val Phe Asn Thr Glu Asp Gly Phe
        275                 280                 285

Lys Tyr Phe Ala His His Asn Glu Asp Leu Gly Asn Glu Glu Gly Glu
    290                 295                 300

Glu Ile Ser Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr
305                 310                 315                 320
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```
Phe Asp Asp Ser Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp
                325                 330                 335

Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly
            340                 345                 350

Leu Ser Leu Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile
        355                 360                 365

Met Gln Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser
    370                 375                 380

Asp Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
385                 390                 395                 400

Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
                405                 410                 415

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn
            420                 425                 430

Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val Gly Glu
        435                 440                 445

Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile
    450                 455                 460

Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asn Pro Glu Thr
465                 470                 475                 480

Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp Asp Ile Lys Tyr Tyr
                485                 490                 495

Phe Asp Glu Lys Gly Ile Met Arg Thr Gly Leu Ile Ser Phe Glu Asn
            500                 505                 510

Asn Asn Tyr Tyr Phe Asn Glu Asn Gly Glu Met Gln Phe Gly Tyr Ile
        515                 520                 525
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Asn Ile Glu Asp Lys Met Phe Tyr Phe Gly Glu Asp Gly Val Met Gln
530 535 540

Ile Gly Val Phe Asn Thr Pro Asp Gly Phe Lys Tyr Phe Ala His Gln
545 550 555 560

Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly
565 570 575

Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile
580 585 590

Ala Ala Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp
595 600 605

Pro Asp Thr Ala
610

<210> 426
<211> 612
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 426

Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys Val Ser Gln Val Lys
1 5 10 15

Ile Arg Phe Val Asn Val Phe Lys Asp Lys Thr Leu Ala Asn Lys Leu
20 25 30

Ser Phe Asn Phe Ser Asp Lys Gln Asp Val Pro Val Ser Glu Ile Ile
35 40 45

Leu Ser Phe Thr Pro Ser Tyr Tyr Glu Asp Gly Leu Ile Gly Tyr Asp
50 55 60

Leu Gly Leu Val Ser Leu Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe

65 70 75 80

Gly Met Met Val Ser Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr
85 90 95

Phe Lys Pro Pro Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly
100 105 110

Asp Asp Lys Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile
115 120 125

Gly Glu Thr Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly
130 135 140

Val Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
145 150 155 160

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
165 170 175

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp Asp
180 185 190

Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu Met His
195 200 205

Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu Asn Gln Ile
210 215 220

Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Val Met Gln Lys Gly
225 230 235 240

Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe Asp Asp Ser Gly Val
245 250 255

Met Lys Val Gly Tyr Thr Glu Ile Asp Gly Lys His Phe Tyr Phe Ala
260 265 270

Glu Asn Gly Glu Met Gln Ile Gly Val Phe Asn Thr Glu Asp Gly Phe

275 280 285

Lys Tyr Phe Ala His His Asn Glu Asp Leu Gly Asn Glu Glu Gly Glu
290 295 300

Glu Ile Ser Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr
305 310 315 320

Phe Asp Asp Ser Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp
325 330 335

Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly
340 345 350

Leu Ser Leu Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile
355 360 365

Met Gln Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser
370 375 380

Asp Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
385 390 395 400

Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
405 410 415

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn
420 425 430

Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val Gly Glu
435 440 445

Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile
450 455 460

Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asn Pro Glu Thr
465 470 475 480

Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp Asp Ile Lys Tyr Tyr

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485 490 495

Phe Asp Glu Lys Gly Ile Met Arg Thr Gly Leu Ile Ser Phe Glu Asn
500 505 510

Asn Asn Tyr Tyr Phe Asn Glu Asn Gly Glu Met Gln Phe Gly Tyr Ile
515 520 525

Asn Ile Glu Asp Lys Met Phe Tyr Phe Gly Glu Asp Gly Val Met Gln
530 535 540

Ile Gly Val Phe Asn Thr Pro Asp Gly Phe Lys Tyr Phe Ala His Gln
545 550 555 560

Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly
565 570 575

Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile
580 585 590

Ala Ala Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp
595 600 605

Pro Asp Thr Ala
610

<210> 427
<211> 612
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 427

Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys Val Ser Gln Val Lys
1 5 10 15

Ile Arg Phe Val Asn Val Phe Lys Asp Lys Thr Leu Ala Asn Lys Leu
20 25 30

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```
Ser Phe Asn Phe Ser Asp Lys Gln Asp Val Pro Val Ser Glu Ile Ile
        35                  40                  45

Leu Ser Phe Thr Pro Ser Tyr Tyr Glu Asp Gly Leu Ile Gly Tyr Asp
    50                  55                  60

Leu Gly Leu Val Ser Leu Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe
65                  70                  75                  80

Gly Met Met Val Ser Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr
                85                  90                  95

Phe Lys Pro Pro Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly
            100                 105                 110

Asp Asp Lys Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile
        115                 120                 125

Gly Glu Thr Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly
    130                 135                 140

Val Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
145                 150                 155                 160

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
                165                 170                 175

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp Asp
            180                 185                 190

Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu Met His
        195                 200                 205

Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu Asn Gln Ile
    210                 215                 220

Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Val Met Gln Lys Gly
225                 230                 235                 240
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```
Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe Asp Asp Ser Gly Val
                245                 250                 255

Met Lys Val Gly Tyr Thr Glu Ile Asp Gly Lys His Phe Tyr Phe Ala
            260                 265                 270

Glu Asn Gly Glu Met Gln Ile Gly Val Phe Asn Thr Glu Asp Gly Phe
        275                 280                 285

Lys Tyr Phe Ala His His Asn Glu Asp Leu Gly Asn Glu Glu Gly Glu
    290                 295                 300

Glu Ile Ser Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr
305                 310                 315                 320

Phe Asp Asp Ser Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp
                325                 330                 335

Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly
            340                 345                 350

Leu Ser Leu Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile
        355                 360                 365

Met Gln Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser
    370                 375                 380

Asp Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
385                 390                 395                 400

Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
                405                 410                 415

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn
            420                 425                 430

Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val Gly Glu
        435                 440                 445
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Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile
450 455 460

Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asn Pro Glu Thr
465 470 475 480

Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp Asp Ile Lys Tyr Tyr
485 490 495

Phe Asp Glu Lys Gly Ile Met Arg Thr Gly Leu Ile Ser Phe Glu Asn
500 505 510

Asn Asn Tyr Tyr Phe Asn Glu Asn Gly Glu Met Gln Phe Gly Tyr Ile
515 520 525

Asn Ile Glu Asp Lys Met Phe Tyr Phe Gly Glu Asp Gly Val Met Gln
530 535 540

Ile Gly Val Phe Asn Thr Pro Asp Gly Phe Lys Tyr Phe Ala His Gln
545 550 555 560

Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly
565 570 575

Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile
580 585 590

Ala Ala Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp
595 600 605

Pro Asp Thr Ala
610

<210> 428
<211> 612
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

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<400> 428

Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys Val Ser Gln Val Lys
1 5 10 15

Ile Arg Phe Val Asn Val Phe Lys Asp Lys Thr Leu Ala Asn Lys Leu
20 25 30

Ser Phe Asn Phe Ser Asp Lys Gln Asp Val Pro Val Ser Glu Ile Ile
35 40 45

Ser Ala Phe Thr Pro Ser Tyr Tyr Glu Asp Gly Leu Ile Gly Tyr Asp
50 55 60

Leu Gly Leu Val Ser Leu Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe
65 70 75 80

Gly Met Met Val Ser Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr
85 90 95

Phe Lys Pro Pro Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly
100 105 110

Asp Asp Lys Tyr Tyr Phe Asn Pro Thr Asn Gly Gly Ala Ala Ser Ile
115 120 125

Gly Glu Thr Ile Ile Asn Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly
130 135 140

Ile Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Leu Lys Tyr Phe
145 150 155 160

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
165 170 175

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Glu Asp
180 185 190

Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu Met Tyr

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195 200 205

Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu Asn Gln Ile
210 215 220

Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Ile Met Gln Lys Gly
225 230 235 240

Phe Val Ser Ile Asn Asp Lys Lys Tyr Tyr Phe Asp Asp Ser Gly Val
245 250 255

Met Lys Val Gly Tyr Ile Glu Ile Asp Gly Lys Tyr Phe Tyr Phe Ala
260 265 270

Glu Asn Gly Glu Met Gln Ile Gly Val Phe Asn Thr Ser Asp Gly Phe
275 280 285

Lys Tyr Phe Ala His His Asn Glu Asp Leu Gly Asn Glu Glu Gly Glu
290 295 300

Ala Ile Ser Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr
305 310 315 320

Phe Asp Tyr Ser Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp
325 330 335

Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Val Gly
340 345 350

Leu Ser Leu Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile
355 360 365

Met Gln Val Gly Phe Val Thr Ile Asn Asn Lys Val Phe Tyr Phe Ser
370 375 380

Asp Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
385 390 395 400

Phe Tyr Ile Asp Glu Lys Gly Ile Val Gln Ile Gly Val Phe Asp Thr

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405 410 415

Ser Asp Glu Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn
420 425 430

Ile Tyr Gly Gln Ala Val Asp Tyr Ser Gly Leu Val Arg Val Gly Glu
435 440 445

Asp Ile Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile
450 455 460

Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asn Pro Glu Thr
465 470 475 480

Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp Asp Ile Lys Tyr Tyr
485 490 495

Phe Asp Glu Asn Gly Ile Met Arg Thr Gly Leu Ile Ser Phe Glu Asn
500 505 510

Asn Asp Tyr Tyr Phe Asn Glu Asn Gly Glu Met Gln Phe Gly Tyr Ile
515 520 525

Asn Ile Glu Asp Lys Met Phe Tyr Phe Gly Glu Asp Gly Val Met Gln
530 535 540

Ile Gly Val Phe Asn Thr Gln Asp Gly Phe Lys Tyr Phe Ala His Gln
545 550 555 560

Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly
565 570 575

Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile
580 585 590

Ala Ala Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp
595 600 605

Pro Asp Thr Ala

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610

<210> 429
<211> 612
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 429

Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys Val Ser Gln Val Lys
1 5 10 15

Ile Arg Phe Val Asn Val Phe Lys Asp Lys Thr Leu Ala Asn Lys Leu
20 25 30

Ser Phe Asn Phe Ser Asp Lys Gln Asp Val Pro Val Ser Glu Ile Ile
35 40 45

Leu Ser Phe Thr Pro Ser Tyr Tyr Glu Asp Gly Leu Ile Gly Tyr Asp
50 55 60

Leu Gly Leu Val Ser Leu Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe
65 70 75 80

Gly Met Met Val Ser Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr
85 90 95

Phe Lys Pro Pro Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly
100 105 110

Asp Asp Lys Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile
115 120 125

Gly Glu Thr Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly
130 135 140

Val Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
145 150 155 160

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Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
165 170 175

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp Asp
180 185 190

Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu Met His
195 200 205

Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu Asn Gln Ile
210 215 220

Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Val Met Gln Lys Gly
225 230 235 240

Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe Asp Asp Ser Gly Val
245 250 255

Met Lys Val Gly Tyr Thr Glu Ile Asp Gly Lys His Phe Tyr Phe Ala
260 265 270

Glu Asn Gly Glu Met Gln Ile Gly Val Phe Asn Thr Glu Asp Gly Phe
275 280 285

Lys Tyr Phe Ala His His Asn Glu Asp Leu Gly Asn Glu Glu Gly Glu
290 295 300

Glu Ile Ser Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr
305 310 315 320

Phe Asp Asp Ser Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp
325 330 335

Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly
340 345 350

Leu Ser Leu Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile
355 360 365

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```
Met Gln Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser
    370                 375                 380

Asp Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
385                 390                 395                 400

Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
                405                 410                 415

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn
            420                 425                 430

Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val Gly Glu
        435                 440                 445

Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile
    450                 455                 460

Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asn Pro Glu Thr
465                 470                 475                 480

Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp Asp Ile Lys Tyr Tyr
                485                 490                 495

Phe Asp Glu Lys Gly Ile Met Arg Thr Gly Leu Ile Ser Phe Glu Asn
            500                 505                 510

Asn Asn Tyr Tyr Phe Asn Glu Asn Gly Glu Met Gln Phe Gly Tyr Ile
        515                 520                 525

Asn Ile Glu Asp Lys Met Phe Tyr Phe Gly Glu Asp Gly Val Met Gln
    530                 535                 540

Ile Gly Val Phe Asn Thr Pro Asp Gly Phe Lys Tyr Phe Ala His Gln
545                 550                 555                 560

Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly
                565                 570                 575
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Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile
580 585 590

Ala Ala Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp
595 600 605

Pro Asp Thr Ala
610

<210> 430
<211> 612
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 430

Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys Val Ser Gln Val Lys
1 5 10 15

Ile Arg Phe Val Asn Val Phe Lys Asp Lys Thr Leu Ala Asn Lys Leu
20 25 30

Ser Phe Asn Phe Ser Asp Lys Gln Asp Val Pro Val Ser Glu Ile Ile
35 40 45

Ser Ala Phe Thr Pro Ser Tyr Tyr Glu Asp Gly Leu Ile Gly Tyr Asp
50 55 60

Leu Gly Leu Val Ser Leu Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe
65 70 75 80

Gly Met Met Val Ser Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr
85 90 95

Phe Lys Pro Pro Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly
100 105 110

Asp Asp Lys Tyr Tyr Phe Asn Pro Thr Asn Gly Gly Ala Ala Ser Ile

115 120 125

Gly Glu Thr Ile Ile Asn Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly
130 135 140

Ile Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Leu Lys Tyr Phe
145 150 155 160

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
165 170 175

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Glu Asp
180 185 190

Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu Met Tyr
195 200 205

Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu Asn Gln Ile
210 215 220

Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Ile Met Gln Lys Gly
225 230 235 240

Phe Val Ser Ile Asn Asp Lys Lys Tyr Tyr Phe Asp Asp Ser Gly Val
245 250 255

Met Lys Val Gly Tyr Ile Glu Ile Asp Gly Lys Tyr Phe Tyr Phe Ala
260 265 270

Glu Asn Gly Glu Met Gln Ile Gly Val Phe Asn Thr Ser Asp Gly Phe
275 280 285

Lys Tyr Phe Ala His His Asn Glu Asp Leu Gly Asn Glu Glu Gly Glu
290 295 300

Ala Ile Ser Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr
305 310 315 320

Phe Asp Tyr Ser Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp

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325 330 335

Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Val Gly
340 345 350

Leu Ser Leu Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile
355 360 365

Met Gln Val Gly Phe Val Thr Ile Asn Asn Lys Val Phe Tyr Phe Ser
370 375 380

Asp Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
385 390 395 400

Phe Tyr Ile Asp Glu Lys Gly Ile Val Gln Ile Gly Val Phe Asp Thr
405 410 415

Ser Asp Glu Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn
420 425 430

Ile Tyr Gly Gln Ala Val Asp Tyr Ser Gly Leu Val Arg Val Gly Glu
435 440 445

Asp Ile Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile
450 455 460

Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asn Pro Glu Thr
465 470 475 480

Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp Asp Ile Lys Tyr Tyr
485 490 495

Phe Asp Glu Asn Gly Ile Met Arg Thr Gly Leu Ile Ser Phe Glu Asn
500 505 510

Asn Asp Tyr Tyr Phe Asn Glu Asn Gly Glu Met Gln Phe Gly Tyr Ile
515 520 525

Asn Ile Glu Asp Lys Met Phe Tyr Phe Gly Glu Asp Gly Val Met Gln

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530 535 540

Ile Gly Val Phe Asn Thr Gln Asp Gly Phe Lys Tyr Phe Ala His Gln
545 550 555 560

Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly
565 570 575

Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile
580 585 590

Ala Ala Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp
595 600 605

Pro Asp Thr Ala
610

<210> 431
<211> 612
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 431

Phe Ile Leu Met Ser Thr Asp Glu Glu Asn Lys Val Ser Gln Val Lys
1 5 10 15

Ile Arg Phe Thr Asn Val Phe Lys Gly Asn Thr Ile Ser Asp Lys Ile
20 25 30

Ser Phe Asn Phe Ser Asp Lys Gln Asp Val Ser Ile Asn Lys Val Ile
35 40 45

Ser Thr Phe Thr Pro Ser Tyr Tyr Val Glu Gly Leu Leu Asn Tyr Asp
50 55 60

Leu Gly Leu Ile Ser Leu Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe
65 70 75 80

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```
Gly Met Met Val Ser Gly Leu Val Tyr Ile Asn Asp Ser Leu Tyr Tyr
                85                  90                  95

Phe Lys Pro Pro Ile Lys Asn Leu Ile Thr Gly Phe Thr Thr Ile Gly
            100                 105                 110

Asp Asp Lys Tyr Tyr Phe Asn Pro Asp Asn Gly Gly Ala Ala Ser Val
        115                 120                 125

Gly Glu Thr Ile Ile Asp Gly Lys Asn Tyr Tyr Phe Ser Gln Asn Gly
    130                 135                 140

Val Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
145                 150                 155                 160

Ala Pro Ala Asp Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
                165                 170                 175

Phe Thr Gly Lys Leu Thr Ile Asp Glu Asn Val Tyr Tyr Phe Gly Asp
            180                 185                 190

Asn Tyr Arg Ala Ala Ile Glu Trp Gln Thr Leu Asp Asp Glu Val Tyr
        195                 200                 205

Tyr Phe Ser Thr Asp Thr Gly Arg Ala Phe Lys Gly Leu Asn Gln Ile
    210                 215                 220

Gly Asp Asp Lys Phe Tyr Phe Asn Ser Asp Gly Ile Met Gln Lys Gly
225                 230                 235                 240

Phe Val Asn Ile Asn Asp Lys Thr Phe Tyr Phe Asp Asp Ser Gly Val
                245                 250                 255

Met Lys Ser Gly Tyr Thr Glu Ile Asp Gly Lys Tyr Phe Tyr Phe Ala
            260                 265                 270

Glu Asn Gly Glu Met Gln Ile Gly Val Phe Asn Thr Ala Asp Gly Phe
        275                 280                 285
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```
Lys Tyr Phe Ala His His Asp Glu Asp Leu Gly Asn Glu Glu Gly Glu
    290                 295                 300

Ala Leu Ser Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr
305                 310                 315                 320

Phe Asp Asp Ser Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp
                325                 330                 335

Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly
            340                 345                 350

Ile Ser Ile Ile Asn Asp Gly Lys Tyr Tyr Phe Asn Asp Ser Gly Ile
        355                 360                 365

Met Gln Ile Gly Phe Val Thr Ile Asn Asn Glu Val Phe Tyr Phe Ser
    370                 375                 380

Asp Ser Gly Ile Val Glu Ser Gly Met Gln Asn Ile Asp Asp Asn Tyr
385                 390                 395                 400

Phe Tyr Ile Asp Glu Asn Gly Leu Val Gln Ile Gly Val Phe Asp Thr
                405                 410                 415

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn
            420                 425                 430

Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val Gly Glu
        435                 440                 445

Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile
    450                 455                 460

Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asp Pro Glu Thr
465                 470                 475                 480

Lys Lys Ala Tyr Lys Gly Ile Asn Val Ile Asp Asp Ile Lys Tyr Tyr
                485                 490                 495
```

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Phe Asp Glu Asn Gly Ile Met Arg Thr Gly Leu Ile Thr Phe Glu Asp
500 505 510

Asn His Tyr Tyr Phe Asn Glu Asp Gly Ile Met Gln Tyr Gly Tyr Leu
515 520 525

Asn Ile Glu Asp Lys Thr Phe Tyr Phe Ser Glu Asp Gly Ile Met Gln
530 535 540

Ile Gly Val Phe Asn Thr Pro Asp Gly Phe Lys Tyr Phe Ala His Gln
545 550 555 560

Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly
565 570 575

Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile
580 585 590

Ala Ala Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp
595 600 605

Pro Asp Thr Ala
610

<210> 432
<211> 612
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 432

Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys Val Ser Gln Val Lys
1 5 10 15

Ile Arg Phe Val Asn Val Phe Lys Asp Lys Thr Leu Ala Asn Lys Leu
20 25 30

Ser Phe Asn Phe Ser Asp Lys Gln Asp Val Pro Val Ser Glu Ile Ile

```
        35                  40                  45

Leu Ser Phe Thr Pro Ser Tyr Tyr Glu Asp Gly Leu Ile Gly Tyr Asp
    50                  55                  60

Leu Gly Leu Val Ser Leu Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe
65                  70                  75                  80

Gly Met Met Val Ser Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr
                85                  90                  95

Phe Lys Pro Pro Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly
            100                 105                 110

Asp Asp Lys Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile
        115                 120                 125

Gly Glu Thr Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly
    130                 135                 140

Val Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
145                 150                 155                 160

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
                165                 170                 175

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp Asp
            180                 185                 190

Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu Met His
        195                 200                 205

Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu Asn Gln Ile
    210                 215                 220

Gly Asp Tyr Lys Tyr Tyr Phe Asn Ser Asp Gly Val Met Gln Lys Gly
225                 230                 235                 240

Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe Asp Asp Ser Gly Val
```

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245 250 255

Met Lys Val Gly Tyr Thr Glu Ile Asp Gly Lys His Phe Tyr Phe Ala
260 265 270

Glu Asn Gly Glu Met Gln Ile Gly Val Phe Asn Thr Glu Asp Gly Phe
275 280 285

Lys Tyr Phe Ala His His Asn Glu Asp Leu Gly Asn Glu Glu Gly Glu
290 295 300

Glu Ile Ser Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr
305 310 315 320

Phe Asp Asp Ser Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp
325 330 335

Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly
340 345 350

Leu Ser Leu Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile
355 360 365

Met Gln Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser
370 375 380

Asp Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
385 390 395 400

Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
405 410 415

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn
420 425 430

Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val Gly Glu
435 440 445

Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile

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450 455 460

Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asn Pro Glu Thr
465 470 475 480

Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp Asp Ile Lys Tyr Tyr
485 490 495

Phe Asp Glu Lys Gly Ile Met Arg Thr Gly Leu Ile Ser Phe Glu Asn
500 505 510

Asn Asn Tyr Tyr Phe Asn Glu Asn Gly Glu Met Gln Phe Gly Tyr Ile
515 520 525

Asn Ile Glu Asp Lys Met Phe Tyr Phe Gly Glu Asp Gly Val Met Gln
530 535 540

Ile Gly Val Phe Asn Thr Pro Asp Gly Phe Lys Tyr Phe Ala His Gln
545 550 555 560

Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly
565 570 575

Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile
580 585 590

Ala Ala Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp
595 600 605

Pro Asp Thr Ala
610

<210> 433
<211> 612
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 433

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2013333532


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Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys Val Ser Gln Val Lys
1               5                  10                  15

Ile Arg Phe Val Asn Val Phe Lys Asp Lys Thr Leu Ala Asn Lys Leu
            20                  25                  30

Ser Phe Asn Phe Ser Asp Lys Gln Asp Val Pro Val Ser Glu Ile Ile
        35                  40                  45

Leu Ser Phe Thr Pro Ser Tyr Tyr Glu Asp Gly Leu Ile Gly Tyr Asp
    50                  55                  60

Leu Gly Leu Val Ser Leu Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe
65                  70                  75                  80

Gly Met Met Val Ser Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr
                85                  90                  95

Phe Lys Pro Pro Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly
            100                 105                 110

Asp Asp Lys Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile
        115                 120                 125

Gly Glu Thr Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly
    130                 135                 140

Val Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
145                 150                 155                 160

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
                165                 170                 175

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Glu Asp
            180                 185                 190

Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu Met His
        195                 200                 205
```

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```
Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu Asn Gln Ile
    210                 215                 220

Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Val Met Gln Lys Gly
225                 230                 235                 240

Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe Asp Asp Ser Gly Val
                245                 250                 255

Met Lys Val Gly Tyr Thr Glu Ile Asp Gly Lys His Phe Tyr Phe Ala
            260                 265                 270

Glu Asn Gly Glu Met Gln Ile Gly Val Phe Asn Thr Glu Asp Gly Phe
        275                 280                 285

Lys Tyr Phe Ala His His Asn Glu Asp Leu Gly Asn Glu Glu Gly Glu
    290                 295                 300

Glu Ile Ser Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr
305                 310                 315                 320

Phe Asp Asp Ser Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp
                325                 330                 335

Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly
            340                 345                 350

Leu Ser Leu Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile
        355                 360                 365

Met Gln Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser
    370                 375                 380

Asp Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
385                 390                 395                 400

Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
                405                 410                 415
```

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```
Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn
            420                 425                 430

Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val Gly Glu
        435                 440                 445

Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile
    450                 455                 460

Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asp Pro Glu Thr
465                 470                 475                 480

Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp Asp Ile Lys Tyr Tyr
                485                 490                 495

Phe Asp Glu Lys Gly Ile Met Arg Thr Gly Leu Ile Ser Phe Glu Asn
            500                 505                 510

Asn Asn Tyr Tyr Phe Asn Glu Asn Gly Glu Met Gln Phe Gly Tyr Ile
        515                 520                 525

Asn Ile Glu Asp Lys Met Phe Tyr Phe Gly Glu Asp Gly Val Met Gln
    530                 535                 540

Ile Gly Val Phe Asn Thr Pro Asp Gly Phe Lys Tyr Phe Ala His Gln
545                 550                 555                 560

Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly
                565                 570                 575

Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile
            580                 585                 590

Ala Ala Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp
        595                 600                 605

Pro Asp Thr Ala
    610
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2013333532

<210> 434
<211> 612
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 434

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Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys Val Ser Gln Val Lys
1               5                   10                  15


Ile Arg Phe Val Asn Val Phe Lys Asp Lys Thr Leu Ala Asn Lys Leu
            20                  25                  30


Ser Phe Asn Phe Ser Asp Lys Gln Asp Val Pro Val Ser Glu Ile Ile
        35                  40                  45


Leu Ser Phe Thr Pro Ser Tyr Tyr Glu Asp Gly Leu Ile Gly Tyr Asp
    50                  55                  60


Leu Gly Leu Val Ser Leu Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe
65                  70                  75                  80


Gly Met Met Val Ser Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr
                85                  90                  95


Phe Lys Pro Pro Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly
            100                 105                 110


Asp Asp Lys Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile
        115                 120                 125


Gly Glu Thr Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly
    130                 135                 140


Val Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
145                 150                 155                 160


Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
```

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165 170 175

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp Asp
180 185 190

Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu Met His
195 200 205

Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu Asn Gln Ile
210 215 220

Gly Asp Tyr Lys Tyr Tyr Phe Asn Ser Asp Gly Val Met Gln Lys Gly
225 230 235 240

Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe Asp Asp Ser Gly Val
245 250 255

Met Lys Val Gly Tyr Thr Glu Ile Asp Gly Lys His Phe Tyr Phe Ala
260 265 270

Glu Asn Gly Glu Met Gln Ile Gly Val Phe Asn Thr Glu Asp Gly Phe
275 280 285

Lys Tyr Phe Ala His His Asn Glu Asp Leu Gly Asn Glu Glu Gly Glu
290 295 300

Glu Ile Ser Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr
305 310 315 320

Phe Asp Asp Ser Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp
325 330 335

Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly
340 345 350

Leu Ser Leu Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile
355 360 365

Met Gln Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser

```
    370                 375                 380

Asp Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
385                 390                 395                 400

Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
                405                 410                 415

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn
            420                 425                 430

Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val Gly Glu
        435                 440                 445

Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile
    450                 455                 460

Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asn Pro Glu Thr
465                 470                 475                 480

Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp Asp Ile Lys Tyr Tyr
                485                 490                 495

Phe Asp Glu Lys Gly Ile Met Arg Thr Gly Leu Ile Ser Phe Glu Asn
            500                 505                 510

Asn Asn Tyr Tyr Phe Asn Glu Asn Gly Glu Met Gln Phe Gly Tyr Ile
        515                 520                 525

Asn Ile Glu Asp Lys Met Phe Tyr Phe Gly Glu Asp Gly Val Met Gln
    530                 535                 540

Ile Gly Val Phe Asn Thr Pro Asp Gly Phe Lys Tyr Phe Ala His Gln
545                 550                 555                 560

Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly
                565                 570                 575

Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile
```

580 585 590

Ala Ala Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp
595 600 605

Pro Asp Thr Ala
610

<210> 435
<211> 612
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 435

Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys Val Ser Gln Val Lys
1 5 10 15

Ile Arg Phe Val Asn Val Phe Lys Asp Lys Thr Leu Ala Asn Lys Leu
20 25 30

Ser Phe Asn Phe Ser Asp Lys Gln Asp Val Pro Val Ser Glu Ile Ile
35 40 45

Ser Ala Phe Thr Pro Ser Tyr Tyr Glu Asp Gly Leu Ile Gly Tyr Asp
50 55 60

Leu Gly Leu Val Ser Leu Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe
65 70 75 80

Gly Met Met Val Ser Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr
85 90 95

Phe Lys Pro Pro Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly
100 105 110

Asp Asp Lys Tyr Tyr Phe Asn Pro Thr Asn Gly Gly Ala Ala Ser Ile
115 120 125

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```
Gly Glu Thr Ile Ile Asn Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly
    130                 135                 140

Ile Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Leu Lys Tyr Phe
145                 150                 155                 160

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
                165                 170                 175

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Glu Asp
            180                 185                 190

Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu Met Tyr
        195                 200                 205

Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu Asn Gln Ile
    210                 215                 220

Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Ile Met Gln Lys Gly
225                 230                 235                 240

Phe Val Ser Ile Asn Asp Lys Lys Tyr Tyr Phe Asp Asp Ser Gly Val
                245                 250                 255

Met Lys Val Gly Tyr Ile Glu Ile Asp Gly Lys Tyr Phe Tyr Phe Ala
            260                 265                 270

Glu Asn Gly Glu Met Gln Ile Gly Val Phe Asn Thr Ser Asp Gly Phe
        275                 280                 285

Lys Tyr Phe Ala His His Asn Glu Asp Leu Gly Asn Glu Glu Gly Glu
    290                 295                 300

Ala Ile Ser Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr
305                 310                 315                 320

Phe Asp Tyr Ser Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp
                325                 330                 335
```

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```
Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Val Gly
            340                 345                 350

Leu Ser Leu Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile
        355                 360                 365

Met Gln Val Gly Phe Val Thr Ile Asn Asn Lys Val Phe Tyr Phe Ser
    370                 375                 380

Asp Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
385                 390                 395                 400

Phe Tyr Ile Asp Glu Lys Gly Ile Val Gln Ile Gly Val Phe Asp Thr
                405                 410                 415

Ser Asp Glu Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn
            420                 425                 430

Ile Tyr Gly Gln Ala Val Asp Tyr Ser Gly Leu Val Arg Val Gly Glu
        435                 440                 445

Asp Ile Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile
    450                 455                 460

Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asn Pro Glu Thr
465                 470                 475                 480

Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp Asp Ile Lys Tyr Tyr
                485                 490                 495

Phe Asp Glu Asn Gly Ile Met Arg Thr Gly Leu Ile Ser Phe Glu Asn
            500                 505                 510

Asn Asp Tyr Tyr Phe Asn Glu Asn Gly Glu Met Gln Phe Gly Tyr Ile
        515                 520                 525

Asn Ile Glu Asp Lys Met Phe Tyr Phe Gly Glu Asp Gly Val Met Gln
    530                 535                 540
```

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Ile Gly Val Phe Asn Thr Gln Asp Gly Phe Lys Tyr Phe Ala His Gln
545 550 555 560

Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly
565 570 575

Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile
580 585 590

Ala Ala Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp
595 600 605

Pro Asp Thr Ala
610

<210> 436
<211> 612
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 436

Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys Val Ser Gln Val Lys
1 5 10 15

Ile Arg Phe Val Asn Val Phe Lys Asp Lys Thr Leu Ala Asn Lys Leu
20 25 30

Ser Phe Asn Phe Ser Asp Lys Gln Asp Val Pro Val Ser Glu Ile Ile
35 40 45

Leu Ser Phe Thr Pro Ser Tyr Tyr Glu Asp Gly Leu Ile Gly Tyr Asp
50 55 60

Leu Gly Leu Val Ser Leu Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe
65 70 75 80

Gly Met Met Val Ser Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr

85 90 95

Phe Lys Pro Pro Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly
100 105 110

Asp Asp Lys Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile
115 120 125

Gly Glu Thr Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly
130 135 140

Val Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
145 150 155 160

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
165 170 175

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp Asp
180 185 190

Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu Met His
195 200 205

Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu Asn Gln Ile
210 215 220

Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Val Met Gln Lys Gly
225 230 235 240

Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe Asp Asp Ser Gly Val
245 250 255

Met Lys Val Gly Tyr Thr Glu Ile Asp Gly Lys His Phe Tyr Phe Ala
260 265 270

Glu Asn Gly Glu Met Gln Ile Gly Val Phe Asn Thr Glu Asp Gly Phe
275 280 285

Lys Tyr Phe Ala His His Asn Glu Asp Leu Gly Asn Glu Glu Gly Glu

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290 295 300

Glu Ile Ser Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr
305 310 315 320

Phe Asp Asp Ser Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp
325 330 335

Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly
340 345 350

Leu Ser Leu Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile
355 360 365

Met Gln Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser
370 375 380

Asp Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
385 390 395 400

Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
405 410 415

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn
420 425 430

Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val Gly Glu
435 440 445

Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile
450 455 460

Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asn Pro Glu Thr
465 470 475 480

Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp Asp Ile Lys Tyr Tyr
485 490 495

Phe Asp Glu Lys Gly Ile Met Arg Thr Gly Leu Ile Ser Phe Glu Asn

```
            500                 505                 510

Asn Asn Tyr Tyr Phe Asn Glu Asn Gly Glu Met Gln Phe Gly Tyr Ile
        515                 520                 525

Asn Ile Glu Asp Lys Met Phe Tyr Phe Gly Glu Asp Gly Val Met Gln
    530                 535                 540

Ile Gly Val Phe Asn Thr Pro Asp Gly Phe Lys Tyr Phe Ala His Gln
545                 550                 555                 560

Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly
                565                 570                 575

Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile
            580                 585                 590

Ala Ala Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp
        595                 600                 605

Pro Asp Thr Ala
    610


<210>  437
<211>  612
<212>  PRT
<213>  Artificial Sequence

<220>
<223>  Synthetic amino acid sequence

<400>  437

Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys Val Ser Gln Val Lys
1               5                   10                  15

Ile Arg Phe Val Asn Val Phe Lys Asp Lys Thr Leu Ala Asn Lys Leu
            20                  25                  30

Ser Phe Asn Phe Ser Asp Lys Gln Asp Val Pro Val Ser Glu Ile Ile
        35                  40                  45
```

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```
Ser Ala Phe Thr Pro Ser Tyr Tyr Glu Asp Gly Leu Ile Gly Tyr Asp
    50                  55                  60

Leu Gly Leu Val Ser Leu Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe
65                  70                  75                  80

Gly Met Met Val Ser Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr
                85                  90                  95

Phe Lys Pro Pro Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly
            100                 105                 110

Asp Asp Lys Tyr Tyr Phe Asn Pro Thr Asn Gly Gly Ala Ala Ser Ile
        115                 120                 125

Gly Glu Thr Ile Ile Asn Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly
    130                 135                 140

Ile Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Leu Lys Tyr Phe
145                 150                 155                 160

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
                165                 170                 175

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Glu Asp
            180                 185                 190

Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu Met Tyr
        195                 200                 205

Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu Asn Gln Ile
    210                 215                 220

Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Ile Met Gln Lys Gly
225                 230                 235                 240

Phe Val Ser Ile Asn Asp Lys Lys Tyr Tyr Phe Asp Asp Ser Gly Val
                245                 250                 255
```

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```
Met Lys Val Gly Tyr Ile Glu Ile Asp Gly Lys Tyr Phe Tyr Phe Ala
            260                 265                 270

Glu Asn Gly Glu Met Gln Ile Gly Val Phe Asn Thr Ser Asp Gly Phe
        275                 280                 285

Lys Tyr Phe Ala His His Asn Glu Asp Leu Gly Asn Glu Glu Gly Glu
    290                 295                 300

Ala Ile Ser Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr
305                 310                 315                 320

Phe Asp Tyr Ser Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp
                325                 330                 335

Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Val Gly
            340                 345                 350

Leu Ser Leu Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile
        355                 360                 365

Met Gln Val Gly Phe Val Thr Ile Asn Asn Lys Val Phe Tyr Phe Ser
    370                 375                 380

Asp Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
385                 390                 395                 400

Phe Tyr Ile Asp Glu Lys Gly Ile Val Gln Ile Gly Val Phe Asp Thr
                405                 410                 415

Ser Asp Glu Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn
            420                 425                 430

Ile Tyr Gly Gln Ala Val Asp Tyr Ser Gly Leu Val Arg Val Gly Glu
        435                 440                 445

Asp Ile Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile
    450                 455                 460
```

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Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asn Pro Glu Thr
465 470 475 480

Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp Asp Ile Lys Tyr Tyr
485 490 495

Phe Asp Glu Asn Gly Ile Met Arg Thr Gly Leu Ile Ser Phe Glu Asn
500 505 510

Asn Asp Tyr Tyr Phe Asn Glu Asn Gly Glu Met Gln Phe Gly Tyr Ile
515 520 525

Asn Ile Glu Asp Lys Met Phe Tyr Phe Gly Glu Asp Gly Val Met Gln
530 535 540

Ile Gly Val Phe Asn Thr Gln Asp Gly Phe Lys Tyr Phe Ala His Gln
545 550 555 560

Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly
565 570 575

Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile
580 585 590

Ala Ala Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp
595 600 605

Pro Asp Thr Ala
610

<210> 438
<211> 612
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 438

Phe Ile Leu Met Ser Thr Asp Glu Glu Asn Lys Val Ser Gln Val Lys

```
1               5                   10                  15

Ile Arg Phe Thr Asn Val Phe Lys Gly Asn Thr Ile Ser Asp Lys Ile
            20                  25                  30

Ser Phe Asn Phe Ser Asp Lys Gln Asp Val Ser Ile Asn Lys Ile Ile
        35                  40                  45

Ser Thr Phe Thr Pro Ser Tyr Tyr Val Glu Gly Leu Leu Asn Tyr His
    50                  55                  60

Leu Gly Leu Ile Ser Leu Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe
65                  70                  75                  80

Gly Met Met Val Ser Gly Leu Val Tyr Ile Asn Asp Ser Leu Tyr Tyr
                85                  90                  95

Phe Lys Pro Pro Ile Lys Asn Leu Ile Thr Gly Phe Thr Thr Ile Gly
            100                 105                 110

Asp Asp Lys Tyr Tyr Phe Asn Pro Asp Asn Gly Gly Ala Ala Ser Val
        115                 120                 125

Gly Glu Thr Ile Ile Asp Gly Lys Asn Tyr Tyr Phe Ser Pro Asn Gly
    130                 135                 140

Val Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
145                 150                 155                 160

Ala Pro Ala Asp Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
                165                 170                 175

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Val Tyr Tyr Phe Gly Asp
            180                 185                 190

Asn Tyr Arg Ala Ala Ile Glu Trp Gln Thr Leu Asp Asp Glu Val Tyr
        195                 200                 205

Tyr Phe Ser Thr Asp Thr Gly Arg Ala Phe Lys Gly Leu Asn Gln Ile
```

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210 215 220

Gly Asp Asp Lys Phe Tyr Phe Asn Ser Asp Gly Ile Met Gln Lys Gly
225 230 235 240

Phe Val Asn Ile Asn Asp Lys Thr Phe Tyr Phe Asp Asp Ser Gly Val
245 250 255

Met Lys Ser Gly Tyr Thr Glu Ile Asp Gly Lys His Phe Tyr Phe Ala
260 265 270

Glu Asn Gly Glu Met Gln Ile Gly Val Phe Asn Thr Ala Asp Gly Phe
275 280 285

Lys Tyr Phe Ala His His Asp Glu Asp Leu Gly Asn Glu Glu Gly Glu
290 295 300

Ala Leu Ser Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr
305 310 315 320

Phe Asp Asp Ser Phe Thr Ala Val Val Gly Trp Lys Asp Ser Glu Asp
325 330 335

Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly
340 345 350

Ile Ser Thr Ile Asn Asp Gly Lys Tyr Tyr Phe Asn Asp Ser Gly Ile
355 360 365

Met Gln Ile Gly Phe Val Thr Ile Asn Asn Glu Val Phe Tyr Phe Ser
370 375 380

Asp Ser Gly Ile Val Glu Ser Gly Met Gln Asn Ile Asp Asp Asn Tyr
385 390 395 400

Phe Tyr Ile Asp Glu Asn Gly Leu Val Gln Ile Gly Val Phe Asp Thr
405 410 415

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn

```
            420                 425                 430

Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val Gly Glu
        435                 440                 445

Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile
    450                 455                 460

Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asp Pro Glu Thr
465                 470                 475                 480

Lys Lys Ala Tyr Lys Gly Ile Asn Val Ile Asp Asp Ile Lys Tyr Tyr
                485                 490                 495

Phe Asp Glu Asn Gly Ile Met Arg Thr Gly Leu Ile Thr Phe Glu Asp
            500                 505                 510

Asn His Tyr Tyr Phe Asn Glu Asp Gly Ile Met Gln Tyr Gly Tyr Ile
        515                 520                 525

Asn Ile Glu Asp Lys Met Phe Tyr Phe Asn Glu Asp Gly Val Met Gln
    530                 535                 540

Ile Gly Val Phe Asn Thr Ala Asp Gly Phe Lys Tyr Phe Ala His Gln
545                 550                 555                 560

Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly
                565                 570                 575

Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile
            580                 585                 590

Ala Ala Ile Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp
        595                 600                 605

Pro Asp Thr Ala
    610
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<210> 439

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<211> 612
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 439

Phe Ile Leu Met Ser Thr Asp Glu Glu Asn Lys Val Ser Gln Val Lys
1 5 10 15

Ile Arg Phe Thr Asn Val Phe Lys Gly Asn Thr Ile Ser Asp Lys Ile
20 25 30

Ser Phe Asn Phe Ser Asp Lys Gln Asp Val Ser Ile Asn Lys Ile Ile
35 40 45

Ser Thr Phe Thr Pro Ser Tyr Tyr Val Glu Gly Leu Leu Asn Tyr His
50 55 60

Leu Gly Leu Ile Ser Leu Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe
65 70 75 80

Gly Met Met Val Ser Gly Leu Val Tyr Ile Asn Asp Ser Leu Tyr Tyr
85 90 95

Phe Lys Pro Pro Ile Lys Asn Leu Ile Thr Gly Phe Thr Thr Ile Gly
100 105 110

Asp Asp Lys Tyr Tyr Phe Asn Pro Asp Asn Gly Gly Ala Ala Ser Val
115 120 125

Gly Glu Thr Ile Ile Asp Gly Lys Asn Tyr Tyr Phe Ser Pro Asn Gly
130 135 140

Val Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
145 150 155 160

Ala Pro Ala Asp Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
165 170 175

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Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Val Tyr Tyr Phe Gly Asp
180 185 190

Asn Tyr Arg Ala Ala Ile Glu Trp Gln Thr Leu Asp Asp Glu Val Tyr
195 200 205

Tyr Phe Ser Thr Asp Thr Gly Arg Ala Phe Lys Gly Leu Asn Gln Ile
210 215 220

Gly Asp Asp Lys Phe Tyr Phe Asn Ser Asp Gly Ile Met Gln Lys Gly
225 230 235 240

Phe Val Asn Ile Asn Asp Lys Thr Phe Tyr Phe Asp Asp Ser Gly Val
245 250 255

Met Lys Ser Gly Tyr Thr Glu Ile Asp Gly Lys His Phe Tyr Phe Ala
260 265 270

Glu Asn Gly Glu Met Gln Ile Gly Val Phe Asn Thr Ala Asp Gly Phe
275 280 285

Lys Tyr Phe Ala His His Asp Glu Asp Leu Gly Asn Glu Glu Gly Glu
290 295 300

Ala Leu Ser Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr
305 310 315 320

Phe Asp Asp Ser Phe Thr Ala Val Val Gly Trp Lys Asp Ser Glu Asp
325 330 335

Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly
340 345 350

Ile Ser Thr Ile Asn Asp Gly Lys Tyr Tyr Phe Asn Asp Ser Gly Ile
355 360 365

Met Gln Ile Gly Phe Val Thr Ile Asn Asn Glu Val Phe Tyr Phe Ser
370 375 380

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```
Asp Ser Gly Ile Val Glu Ser Gly Met Gln Asn Ile Asp Asp Asn Tyr
385                 390                 395                 400

Phe Tyr Ile Asp Glu Asn Gly Leu Val Gln Ile Gly Val Phe Asp Thr
                405                 410                 415

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn
            420                 425                 430

Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val Gly Glu
        435                 440                 445

Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile
    450                 455                 460

Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asp Pro Glu Thr
465                 470                 475                 480

Lys Lys Ala Tyr Lys Gly Ile Asn Val Ile Asp Asp Ile Lys Tyr Tyr
                485                 490                 495

Phe Asp Glu Asn Gly Ile Met Arg Thr Gly Leu Ile Thr Phe Glu Asp
            500                 505                 510

Asn His Tyr Tyr Phe Asn Glu Asp Gly Ile Met Gln Tyr Gly Tyr Ile
        515                 520                 525

Asn Ile Glu Asp Lys Met Phe Tyr Phe Asn Glu Asp Gly Val Met Gln
    530                 535                 540

Ile Gly Val Phe Asn Thr Ala Asp Gly Phe Lys Tyr Phe Ala His Gln
545                 550                 555                 560

Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly
                565                 570                 575

Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile
            580                 585                 590
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Ala Ala Ile Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp
595 600 605

Pro Asp Thr Ala
610

<210> 440
<211> 612
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 440

Phe Ile Leu Met Ser Thr Asp Glu Glu Asn Lys Val Ser Gln Val Lys
1 5 10 15

Ile Arg Phe Thr Asn Val Phe Lys Gly Asn Thr Ile Ser Asp Lys Ile
20 25 30

Ser Phe Asn Phe Ser Asp Lys Gln Asp Val Ser Ile Asn Lys Ile Ile
35 40 45

Ser Thr Phe Thr Pro Ser Tyr Tyr Val Glu Gly Leu Leu Asn Tyr His
50 55 60

Leu Gly Leu Ile Ser Leu Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe
65 70 75 80

Gly Met Met Val Ser Gly Leu Val Tyr Ile Asn Asp Ser Leu Tyr Tyr
85 90 95

Phe Lys Pro Pro Ile Lys Asn Leu Ile Thr Gly Phe Thr Thr Ile Gly
100 105 110

Asp Asp Lys Tyr Tyr Phe Asn Pro Asp Asn Gly Gly Ala Ala Ser Val
115 120 125

Gly Glu Thr Ile Ile Asp Gly Lys Asn Tyr Tyr Phe Ser Pro Asn Gly

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```
    130                 135                 140

Val Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
145                 150                 155                 160

Ala Pro Ala Asp Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
                165                 170                 175

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Val Tyr Tyr Phe Gly Asp
            180                 185                 190

Asn Tyr Arg Ala Ala Ile Glu Trp Gln Thr Leu Asp Asp Glu Val Tyr
        195                 200                 205

Tyr Phe Ser Thr Asp Thr Gly Arg Ala Phe Lys Gly Leu Asn Gln Ile
    210                 215                 220

Gly Asp Asp Lys Phe Tyr Phe Asn Ser Asp Gly Ile Met Gln Lys Gly
225                 230                 235                 240

Phe Val Asn Ile Asn Asp Lys Thr Phe Tyr Phe Asp Asp Ser Gly Val
                245                 250                 255

Met Lys Ser Gly Tyr Thr Glu Ile Asp Gly Lys His Phe Tyr Phe Ala
            260                 265                 270

Glu Asn Gly Glu Met Gln Ile Gly Val Phe Asn Thr Ala Asp Gly Phe
        275                 280                 285

Lys Tyr Phe Ala His His Asp Glu Asp Leu Gly Asn Glu Glu Gly Glu
    290                 295                 300

Ala Leu Ser Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr
305                 310                 315                 320

Phe Asp Asp Ser Phe Thr Ala Val Val Gly Trp Lys Asp Ser Glu Asp
                325                 330                 335

Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly
```

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340 345 350

Ile Ser Thr Ile Asn Asp Gly Lys Tyr Tyr Phe Asn Asp Ser Gly Ile
355 360 365

Met Gln Ile Gly Phe Val Thr Ile Asn Asn Glu Val Phe Tyr Phe Ser
370 375 380

Asp Ser Gly Ile Val Glu Ser Gly Met Gln Asn Ile Asp Asp Asn Tyr
385 390 395 400

Phe Tyr Ile Asp Glu Asn Gly Leu Val Gln Ile Gly Val Phe Asp Thr
405 410 415

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn
420 425 430

Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val Gly Glu
435 440 445

Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile
450 455 460

Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asp Pro Glu Thr
465 470 475 480

Lys Lys Ala Tyr Lys Gly Ile Asn Val Ile Asp Asp Ile Lys Tyr Tyr
485 490 495

Phe Asp Glu Asn Gly Ile Met Arg Thr Gly Leu Ile Thr Phe Glu Asp
500 505 510

Asn His Tyr Tyr Phe Asn Glu Asp Gly Ile Met Gln Tyr Gly Tyr Ile
515 520 525

Asn Ile Glu Asp Lys Met Phe Tyr Phe Asn Glu Asp Gly Val Met Gln
530 535 540

Ile Gly Val Phe Asn Thr Ala Asp Gly Phe Lys Tyr Phe Ala His Gln

545 550 555 560

Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly
565 570 575

Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile
580 585 590

Ala Ala Ile Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp
595 600 605

Pro Asp Thr Ala
610

<210> 441
<211> 612
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 441

Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys Val Ser Gln Val Lys
1 5 10 15

Ile Arg Phe Val Asn Val Phe Lys Asp Lys Thr Leu Ala Asn Lys Leu
20 25 30

Ser Phe Asn Phe Ser Asp Lys Gln Asp Val Pro Val Ser Glu Ile Ile
35 40 45

Leu Ser Phe Thr Pro Ser Tyr Tyr Glu Asp Gly Leu Ile Gly Tyr Asp
50 55 60

Leu Gly Leu Val Ser Leu Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe
65 70 75 80

Gly Met Met Val Ser Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr
85 90 95

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```
Phe Lys Pro Pro Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly
            100                 105                 110

Asp Asp Lys Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile
        115                 120                 125

Gly Glu Thr Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly
    130                 135                 140

Val Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
145                 150                 155                 160

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
                165                 170                 175

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp Asp
            180                 185                 190

Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu Met His
        195                 200                 205

Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu Asn Gln Ile
    210                 215                 220

Gly Asp Tyr Lys Tyr Tyr Phe Asn Ser Asp Gly Val Met Gln Lys Gly
225                 230                 235                 240

Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe Asp Asp Ser Gly Val
                245                 250                 255

Met Lys Val Gly Tyr Thr Glu Ile Asp Gly Lys His Phe Tyr Phe Ala
            260                 265                 270

Glu Asn Gly Glu Met Gln Ile Gly Val Phe Asn Thr Glu Asp Gly Phe
        275                 280                 285

Lys Tyr Phe Ala His His Asn Glu Asp Leu Gly Asn Glu Glu Gly Glu
    290                 295                 300
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```
Glu Ile Ser Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr
305                 310                 315                 320

Phe Asp Asp Ser Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp
                325                 330                 335

Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly
            340                 345                 350

Leu Ser Leu Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile
        355                 360                 365

Met Gln Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser
    370                 375                 380

Asp Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
385                 390                 395                 400

Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
                405                 410                 415

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn
            420                 425                 430

Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val Gly Glu
        435                 440                 445

Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile
    450                 455                 460

Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asn Pro Glu Thr
465                 470                 475                 480

Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp Asp Ile Lys Tyr Tyr
                485                 490                 495

Phe Asp Glu Lys Gly Ile Met Arg Thr Gly Leu Ile Ser Phe Glu Asn
            500                 505                 510
```

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Asn Asn Tyr Tyr Phe Asn Glu Asn Gly Glu Met Gln Phe Gly Tyr Ile
515 520 525

Asn Ile Glu Asp Lys Met Phe Tyr Phe Gly Glu Asp Gly Val Met Gln
530 535 540

Ile Gly Val Phe Asn Thr Pro Asp Gly Phe Lys Tyr Phe Ala His Gln
545 550 555 560

Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly
565 570 575

Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile
580 585 590

Ala Ala Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp
595 600 605

Pro Asp Thr Ala
610

<210> 442
<211> 612
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 442

Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys Val Ser Gln Val Lys
1 5 10 15

Ile Arg Phe Val Asn Val Phe Lys Asp Lys Thr Leu Ala Asn Lys Leu
20 25 30

Ser Phe Asn Phe Ser Asp Lys Gln Asp Val Pro Val Ser Glu Ile Ile
35 40 45

Leu Ser Phe Thr Pro Ser Tyr Tyr Glu Asp Gly Leu Ile Gly Tyr Asp

```
    50                  55                  60

Leu Gly Leu Val Ser Leu Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe
65                  70                  75                  80

Gly Met Met Val Ser Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr
                85                  90                  95

Phe Lys Pro Pro Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly
            100                 105                 110

Asp Asp Lys Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile
        115                 120                 125

Gly Glu Thr Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly
    130                 135                 140

Val Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
145                 150                 155                 160

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
                165                 170                 175

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp Asp
            180                 185                 190

Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu Met His
        195                 200                 205

Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu Asn Gln Ile
    210                 215                 220

Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Val Met Gln Lys Gly
225                 230                 235                 240

Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe Asp Asp Ser Gly Val
                245                 250                 255

Met Lys Val Gly Tyr Thr Glu Ile Asp Gly Lys His Phe Tyr Phe Ala
```

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260 265 270

Glu Asn Gly Glu Met Gln Ile Gly Val Phe Asn Thr Glu Asp Gly Phe
275 280 285

Lys Tyr Phe Ala His His Asn Glu Asp Leu Gly Asn Glu Glu Gly Glu
290 295 300

Glu Ile Ser Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr
305 310 315 320

Phe Asp Asp Ser Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp
325 330 335

Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly
340 345 350

Leu Ser Leu Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile
355 360 365

Met Gln Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser
370 375 380

Asp Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
385 390 395 400

Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
405 410 415

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn
420 425 430

Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val Gly Glu
435 440 445

Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile
450 455 460

Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asn Pro Glu Thr

465 470 475 480

Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp Asp Ile Lys Tyr Tyr
485 490 495

Phe Asp Glu Lys Gly Ile Met Arg Thr Gly Leu Ile Ser Phe Glu Asn
500 505 510

Asn Asn Tyr Tyr Phe Asn Glu Asn Gly Glu Met Gln Phe Gly Tyr Ile
515 520 525

Asn Ile Glu Asp Lys Met Phe Tyr Phe Gly Glu Asp Gly Val Met Gln
530 535 540

Ile Gly Val Phe Asn Thr Pro Asp Gly Phe Lys Tyr Phe Ala His Gln
545 550 555 560

Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly
565 570 575

Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile
580 585 590

Ala Ala Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp
595 600 605

Pro Asp Thr Ala
610

<210> 443
<211> 612
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 443

Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys Val Ser Gln Val Lys
1 5 10 15

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Ile Arg Phe Val Asn Val Phe Lys Asp Lys Thr Leu Ala Asn Lys Leu
            20                  25                  30

Ser Phe Asn Phe Ser Asp Lys Gln Asp Val Pro Val Ser Glu Ile Ile
        35                  40                  45

Leu Ser Phe Thr Pro Ser Tyr Tyr Glu Asp Gly Leu Ile Gly Tyr Asp
    50                  55                  60

Leu Gly Leu Val Ser Leu Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe
65                  70                  75                  80

Gly Met Met Leu Ser Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr
                85                  90                  95

Phe Lys Pro Pro Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly
            100                 105                 110

Asp Asp Lys Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile
        115                 120                 125

Gly Glu Thr Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly
    130                 135                 140

Val Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
145                 150                 155                 160

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
                165                 170                 175

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp Asp
            180                 185                 190

Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu Met His
        195                 200                 205

Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu Asn Gln Ile
    210                 215                 220
```

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```
Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Val Met Gln Lys Gly
225                 230                 235                 240

Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe Asp Asp Ser Gly Val
                245                 250                 255

Met Lys Val Gly Tyr Thr Glu Ile Asp Gly Lys His Phe Tyr Phe Ala
            260                 265                 270

Glu Asn Gly Glu Met Gln Ile Gly Val Phe Asn Thr Glu Asp Gly Phe
        275                 280                 285

Lys Tyr Phe Ala His His Asn Glu Asp Leu Gly Asn Glu Glu Gly Glu
    290                 295                 300

Glu Ile Ser Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr
305                 310                 315                 320

Phe Asp Asp Ser Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp
                325                 330                 335

Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly
            340                 345                 350

Leu Ser Leu Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile
        355                 360                 365

Met Gln Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser
    370                 375                 380

Asp Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
385                 390                 395                 400

Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
                405                 410                 415

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn
            420                 425                 430
```

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Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val Gly Glu
435 440 445

Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile
450 455 460

Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asn Pro Glu Thr
465 470 475 480

Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp Asp Ile Lys Tyr Tyr
485 490 495

Phe Asp Glu Lys Gly Ile Met Arg Thr Gly Leu Ile Ser Phe Glu Asn
500 505 510

Asn Asn Tyr Tyr Phe Asn Glu Asn Gly Glu Met Gln Phe Gly Tyr Ile
515 520 525

Asn Ile Glu Asp Lys Met Phe Tyr Phe Gly Glu Asp Gly Val Met Gln
530 535 540

Ile Gly Val Phe Asn Thr Pro Asp Gly Phe Lys Tyr Phe Ala His Gln
545 550 555 560

Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly
565 570 575

Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile
580 585 590

Ala Ala Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp
595 600 605

Pro Asp Thr Ala
610

<210> 444
<211> 612
<212> PRT

17 Jun 2019
2013333532

<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 444

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Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys Val Ser Gln Val Lys
1               5                  10                  15

Ile Arg Phe Val Asn Val Phe Lys Asp Lys Thr Leu Ala Asn Lys Leu
            20                  25                  30

Ser Phe Asn Phe Ser Asp Lys Gln Asp Val Pro Val Ser Glu Ile Ile
        35                  40                  45

Leu Ser Phe Thr Pro Ser Tyr Tyr Glu Asp Gly Leu Ile Gly Tyr Asp
    50                  55                  60

Leu Gly Leu Val Ser Leu Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe
65                  70                  75                  80

Gly Met Met Val Ser Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr
                85                  90                  95

Phe Lys Pro Pro Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly
            100                 105                 110

Asp Asp Lys Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile
        115                 120                 125

Gly Glu Thr Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly
    130                 135                 140

Val Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
145                 150                 155                 160

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
                165                 170                 175

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp Asp
```

```
            180                 185                 190

Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu Met His
        195                 200                 205

Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu Asn Gln Ile
    210                 215                 220

Gly Asp Tyr Lys Tyr Tyr Phe Asn Ser Asp Gly Val Met Gln Lys Gly
225                 230                 235                 240

Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe Asp Asp Ser Gly Val
                245                 250                 255

Met Lys Val Gly Tyr Thr Glu Ile Asp Gly Lys His Phe Tyr Phe Ala
            260                 265                 270

Glu Asn Gly Glu Met Gln Ile Gly Val Phe Asn Thr Glu Asp Gly Phe
        275                 280                 285

Lys Tyr Phe Ala His His Asn Glu Asp Leu Gly Asn Glu Glu Gly Glu
    290                 295                 300

Glu Ile Ser Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr
305                 310                 315                 320

Phe Asp Asp Ser Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp
                325                 330                 335

Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly
            340                 345                 350

Leu Ser Leu Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile
        355                 360                 365

Met Gln Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser
    370                 375                 380

Asp Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
```

385 390 395 400

Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
405 410 415

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn
420 425 430

Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val Gly Glu
435 440 445

Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile
450 455 460

Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asn Pro Glu Thr
465 470 475 480

Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp Asp Ile Lys Tyr Tyr
485 490 495

Phe Asp Glu Lys Gly Ile Met Arg Thr Gly Leu Ile Ser Phe Glu Asn
500 505 510

Asn Asn Tyr Tyr Phe Asn Glu Asn Gly Glu Met Gln Phe Gly Tyr Ile
515 520 525

Asn Ile Glu Asp Lys Met Phe Tyr Phe Gly Glu Asp Gly Val Met Gln
530 535 540

Ile Gly Val Phe Asn Thr Pro Asp Gly Phe Lys Tyr Phe Ala His Gln
545 550 555 560

Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly
565 570 575

Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile
580 585 590

Ala Ala Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp

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595 600 605

Pro Asp Thr Ala
610

<210> 445
<211> 612
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 445

Phe Ile Leu Met Ser Thr Asp Glu Glu Asn Lys Val Ser Gln Val Lys
1 5 10 15

Ile Arg Phe Thr Asn Val Phe Lys Gly Asn Thr Ile Ser Asp Lys Ile
20 25 30

Ser Phe Asn Phe Ser Asp Lys Gln Asp Val Ser Ile Asn Lys Val Ile
35 40 45

Ser Thr Phe Thr Pro Ser Tyr Tyr Val Glu Gly Leu Leu Asn Tyr Asp
50 55 60

Leu Gly Leu Ile Ser Leu Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe
65 70 75 80

Gly Met Met Val Ser Gly Leu Val Tyr Ile Asn Asp Ser Leu Tyr Tyr
85 90 95

Phe Lys Pro Pro Ile Lys Asn Leu Ile Thr Gly Phe Thr Thr Ile Gly
100 105 110

Asp Asp Lys Tyr Tyr Phe Asn Pro Asp Asn Gly Gly Ala Ala Ser Val
115 120 125

Gly Glu Thr Ile Ile Asp Gly Lys Asn Tyr Tyr Phe Ser Gln Asn Gly
130 135 140

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```
Val Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
145                 150                 155                 160

Ala Pro Ala Asp Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
                165                 170                 175

Phe Thr Gly Lys Leu Thr Ile Asp Glu Asn Val Tyr Tyr Phe Gly Asp
            180                 185                 190

Asn Tyr Arg Ala Ala Ile Glu Trp Gln Thr Leu Asp Asp Glu Val Tyr
        195                 200                 205

Tyr Phe Ser Thr Asp Thr Gly Arg Ala Phe Lys Gly Leu Asn Gln Ile
    210                 215                 220

Gly Asp Asp Lys Phe Tyr Phe Asn Ser Asp Gly Ile Met Gln Lys Gly
225                 230                 235                 240

Phe Val Asn Ile Asn Asp Lys Thr Phe Tyr Phe Asp Asp Ser Gly Val
                245                 250                 255

Met Lys Ser Gly Tyr Thr Glu Ile Asp Gly Lys Tyr Phe Tyr Phe Ala
            260                 265                 270

Glu Asn Gly Glu Met Gln Ile Gly Val Phe Asn Thr Ala Asp Gly Phe
        275                 280                 285

Lys Tyr Phe Ala His His Asp Glu Asp Leu Gly Asn Glu Glu Gly Glu
    290                 295                 300

Ala Leu Ser Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr
305                 310                 315                 320

Phe Asp Asp Ser Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp
                325                 330                 335

Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly
            340                 345                 350
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Ile Ser Ile Ile Asn Asp Gly Lys Tyr Tyr Phe Asn Asp Ser Gly Ile
355 360 365

Met Gln Ile Gly Phe Val Thr Ile Asn Asn Glu Val Phe Tyr Phe Ser
370 375 380

Asp Ser Gly Ile Val Glu Ser Gly Met Gln Asn Ile Asp Asp Asn Tyr
385 390 395 400

Phe Tyr Ile Asp Glu Asn Gly Leu Val Gln Ile Gly Val Phe Asp Thr
405 410 415

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn
420 425 430

Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val Gly Glu
435 440 445

Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile
450 455 460

Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asp Pro Glu Thr
465 470 475 480

Lys Lys Ala Tyr Lys Gly Ile Asn Val Ile Asp Asp Ile Lys Tyr Tyr
485 490 495

Phe Asp Glu Asn Gly Ile Met Arg Thr Gly Leu Ile Thr Phe Glu Asp
500 505 510

Asn His Tyr Tyr Phe Asn Glu Asp Gly Ile Met Gln Tyr Gly Tyr Leu
515 520 525

Asn Ile Glu Asp Lys Thr Phe Tyr Phe Ser Glu Asp Gly Ile Met Gln
530 535 540

Ile Gly Val Phe Asn Thr Pro Asp Gly Phe Lys Tyr Phe Ala His Gln
545 550 555 560

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Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly
565 570 575

Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile
580 585 590

Ala Ala Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp
595 600 605

Pro Asp Thr Ala
610

<210> 446
<211> 612
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 446

Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys Val Ser Gln Val Lys
1 5 10 15

Ile Arg Phe Val Asn Val Phe Lys Asp Lys Thr Leu Ala Asn Lys Leu
20 25 30

Ser Phe Asn Phe Ser Asp Lys Gln Asp Val Pro Val Ser Glu Ile Ile
35 40 45

Leu Ser Phe Thr Pro Ser Tyr Tyr Glu Asp Gly Leu Ile Gly Tyr Asp
50 55 60

Leu Gly Leu Val Ser Leu Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe
65 70 75 80

Gly Met Met Val Ser Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr
85 90 95

Phe Lys Pro Pro Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly

```
            100                 105                 110

Asp Asp Lys Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile
        115                 120                 125

Gly Glu Thr Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly
    130                 135                 140

Val Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
145                 150                 155                 160

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
                165                 170                 175

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp Asp
            180                 185                 190

Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu Met His
        195                 200                 205

Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu Asn Gln Ile
    210                 215                 220

Gly Asp Tyr Lys Tyr Tyr Phe Asn Ser Asp Gly Val Met Gln Lys Gly
225                 230                 235                 240

Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe Asp Asp Ser Gly Val
                245                 250                 255

Met Lys Val Gly Tyr Thr Glu Ile Asp Gly Lys His Phe Tyr Phe Ala
            260                 265                 270

Glu Asn Gly Glu Met Gln Ile Gly Val Phe Asn Thr Glu Asp Gly Phe
        275                 280                 285

Lys Tyr Phe Ala His His Asn Glu Asp Leu Gly Asn Glu Glu Gly Glu
    290                 295                 300

Glu Ile Ser Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr
```

305 310 315 320

Phe Asp Asp Ser Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp
325 330 335

Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly
340 345 350

Leu Ser Leu Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile
355 360 365

Met Gln Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser
370 375 380

Asp Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
385 390 395 400

Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
405 410 415

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn
420 425 430

Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val Gly Glu
435 440 445

Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile
450 455 460

Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asn Pro Glu Thr
465 470 475 480

Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp Asp Ile Lys Tyr Tyr
485 490 495

Phe Asp Glu Lys Gly Ile Met Arg Thr Gly Leu Ile Ser Phe Glu Asn
500 505 510

Asn Asn Tyr Tyr Phe Asn Glu Asn Gly Glu Met Gln Phe Gly Tyr Ile

515 520 525

Asn Ile Glu Asp Lys Met Phe Tyr Phe Gly Glu Asp Gly Val Met Gln
530 535 540

Ile Gly Val Phe Asn Thr Pro Asp Gly Phe Lys Tyr Phe Ala His Gln
545 550 555 560

Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly
565 570 575

Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile
580 585 590

Ala Ala Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp
595 600 605

Pro Asp Thr Ala
610

<210> 447
<211> 612
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 447

Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys Val Ser Gln Val Lys
1 5 10 15

Ile Arg Phe Val Asn Val Phe Lys Asp Lys Thr Leu Ala Asn Lys Leu
20 25 30

Ser Phe Asn Phe Ser Asp Lys Gln Asp Val Pro Val Ser Glu Ile Ile
35 40 45

Leu Ser Phe Thr Pro Ser Tyr Tyr Glu Asp Gly Leu Ile Gly Tyr Asp
50 55 60

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```
Leu Gly Leu Val Ser Leu Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe
65                  70                  75                  80

Gly Met Met Val Ser Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr
                85                  90                  95

Phe Lys Pro Pro Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly
            100                 105                 110

Asp Asp Lys Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile
        115                 120                 125

Gly Glu Thr Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly
    130                 135                 140

Val Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
145                 150                 155                 160

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
                165                 170                 175

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp Asp
            180                 185                 190

Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu Met His
        195                 200                 205

Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu Asn Gln Ile
    210                 215                 220

Gly Asp Tyr Lys Tyr Tyr Phe Asn Ser Asp Gly Val Met Gln Lys Gly
225                 230                 235                 240

Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe Asp Asp Ser Gly Val
                245                 250                 255

Met Lys Val Gly Tyr Thr Glu Ile Asp Gly Lys His Phe Tyr Phe Ala
            260                 265                 270
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```
Glu Asn Gly Glu Met Gln Ile Gly Val Phe Asn Thr Glu Asp Gly Phe
        275                 280                 285

Lys Tyr Phe Ala His His Asn Glu Asp Leu Gly Asn Glu Glu Gly Glu
    290                 295                 300

Glu Ile Ser Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr
305                 310                 315                 320

Phe Asp Asp Ser Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp
                325                 330                 335

Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly
            340                 345                 350

Leu Ser Leu Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile
        355                 360                 365

Met Gln Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser
    370                 375                 380

Asp Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
385                 390                 395                 400

Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
                405                 410                 415

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn
            420                 425                 430

Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val Gly Glu
        435                 440                 445

Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile
    450                 455                 460

Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asn Pro Glu Thr
465                 470                 475                 480
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Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp Asp Ile Lys Tyr Tyr
485 490 495

Phe Asp Glu Lys Gly Ile Met Arg Thr Gly Leu Ile Ser Phe Glu Asn
500 505 510

Asn Asn Tyr Tyr Phe Asn Glu Asn Gly Glu Met Gln Phe Gly Tyr Ile
515 520 525

Asn Ile Glu Asp Lys Met Phe Tyr Phe Gly Glu Asp Gly Val Met Gln
530 535 540

Ile Gly Val Phe Asn Thr Pro Asp Gly Phe Lys Tyr Phe Ala His Gln
545 550 555 560

Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly
565 570 575

Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile
580 585 590

Ala Ala Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp
595 600 605

Pro Asp Thr Ala
610

<210> 448
<211> 612
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 448

Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys Val Ser Gln Val Lys
1 5 10 15

Ile Arg Phe Val Asn Val Phe Lys Asp Lys Thr Leu Ala Asn Lys Leu

```
            20                  25                  30

Ser Phe Asn Phe Ser Asp Lys Gln Asp Val Pro Val Ser Glu Ile Ile
        35                  40                  45

Leu Ser Phe Thr Pro Ser Tyr Tyr Glu Asp Gly Leu Ile Gly Tyr Asp
    50                  55                  60

Leu Gly Leu Val Ser Leu Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe
65                  70                  75                  80

Gly Met Met Val Ser Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr
                85                  90                  95

Phe Lys Pro Pro Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly
            100                 105                 110

Asp Asp Lys Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile
        115                 120                 125

Gly Glu Thr Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly
    130                 135                 140

Val Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
145                 150                 155                 160

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
                165                 170                 175

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp Asp
            180                 185                 190

Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu Met His
        195                 200                 205

Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu Asn Gln Ile
    210                 215                 220

Gly Asp Tyr Lys Tyr Tyr Phe Asn Ser Asp Gly Val Met Gln Lys Gly
```

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225 230 235 240

Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe Asp Asp Ser Gly Val
245 250 255

Met Lys Val Gly Tyr Thr Glu Ile Asp Gly Lys His Phe Tyr Phe Ala
260 265 270

Glu Asn Gly Glu Met Gln Ile Gly Val Phe Asn Thr Glu Asp Gly Phe
275 280 285

Lys Tyr Phe Ala His His Asn Glu Asp Leu Gly Asn Glu Glu Gly Glu
290 295 300

Glu Ile Ser Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr
305 310 315 320

Phe Asp Asp Ser Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp
325 330 335

Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly
340 345 350

Leu Ser Leu Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile
355 360 365

Met Gln Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser
370 375 380

Asp Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
385 390 395 400

Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
405 410 415

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn
420 425 430

Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val Gly Glu

435 440 445

Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile
450 455 460

Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asn Pro Glu Thr
465 470 475 480

Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp Asp Ile Lys Tyr Tyr
485 490 495

Phe Asp Glu Lys Gly Ile Met Arg Thr Gly Leu Ile Ser Phe Glu Asn
500 505 510

Asn Asn Tyr Tyr Phe Asn Glu Asn Gly Glu Met Gln Phe Gly Tyr Ile
515 520 525

Asn Ile Glu Asp Lys Met Phe Tyr Phe Gly Glu Asp Gly Val Met Gln
530 535 540

Ile Gly Val Phe Asn Thr Pro Asp Gly Phe Lys Tyr Phe Ala His Gln
545 550 555 560

Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly
565 570 575

Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile
580 585 590

Ala Ala Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp
595 600 605

Pro Asp Thr Ala
610

<210> 449
<211> 612
<212> PRT
<213> Artificial Sequence

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<220>
<223> Synthetic amino acid sequence

<400> 449

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Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys Val Ser Gln Val Lys
1               5                  10                  15

Ile Arg Phe Val Asn Val Phe Lys Asp Lys Thr Leu Ala Asn Lys Leu
            20                  25                  30

Ser Phe Asn Phe Ser Asp Lys Gln Asp Val Pro Val Ser Glu Ile Ile
        35                  40                  45

Leu Ser Phe Thr Pro Ser Tyr Tyr Glu Asp Gly Leu Ile Gly Tyr Asp
    50                  55                  60

Leu Gly Leu Val Ser Leu Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe
65                  70                  75                  80

Gly Met Met Val Ser Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr
                85                  90                  95

Phe Lys Pro Pro Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly
            100                 105                 110

Asp Asp Lys Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile
        115                 120                 125

Gly Glu Thr Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly
    130                 135                 140

Val Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
145                 150                 155                 160

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
                165                 170                 175

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp Asp
            180                 185                 190
```

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```
Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu Met His
        195                 200                 205

Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu Asn Gln Ile
    210                 215                 220

Gly Asp Tyr Lys Tyr Tyr Phe Asn Ser Asp Gly Val Met Gln Lys Gly
225                 230                 235                 240

Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe Asp Asp Ser Gly Val
                245                 250                 255

Met Lys Val Gly Tyr Thr Glu Ile Asp Gly Lys His Phe Tyr Phe Ala
            260                 265                 270

Glu Asn Gly Glu Met Gln Ile Gly Val Phe Asn Thr Glu Asp Gly Phe
        275                 280                 285

Lys Tyr Phe Ala His His Asn Glu Asp Leu Gly Asn Glu Glu Gly Glu
    290                 295                 300

Glu Ile Ser Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr
305                 310                 315                 320

Phe Asp Asp Ser Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp
                325                 330                 335

Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly
            340                 345                 350

Leu Ser Leu Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile
        355                 360                 365

Met Gln Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser
    370                 375                 380

Asp Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
385                 390                 395                 400
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```
Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
                405                 410                 415

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn
            420                 425                 430

Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val Gly Glu
        435                 440                 445

Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile
    450                 455                 460

Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asn Pro Glu Thr
465                 470                 475                 480

Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp Asp Ile Lys Tyr Tyr
                485                 490                 495

Phe Asp Glu Lys Gly Ile Met Arg Thr Gly Leu Ile Ser Phe Glu Asn
            500                 505                 510

Asn Asn Tyr Tyr Phe Asn Glu Asn Gly Glu Met Gln Phe Gly Tyr Ile
        515                 520                 525

Asn Ile Glu Asp Lys Met Phe Tyr Phe Gly Glu Asp Gly Val Met Gln
    530                 535                 540

Ile Gly Val Phe Asn Thr Pro Asp Gly Phe Lys Tyr Phe Ala His Gln
545                 550                 555                 560

Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly
                565                 570                 575

Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile
            580                 585                 590

Ala Ala Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp
        595                 600                 605
```

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Pro Asp Thr Ala
610

<210> 450
<211> 612
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 450

Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys Val Ser Gln Val Lys
1 5 10 15

Ile Arg Phe Val Asn Val Phe Lys Asp Lys Thr Leu Ala Asn Lys Leu
20 25 30

Ser Phe Asn Phe Ser Asp Lys Gln Asp Val Pro Val Ser Glu Ile Ile
35 40 45

Leu Ser Phe Thr Pro Ser Tyr Tyr Glu Asp Gly Leu Ile Gly Tyr Asp
50 55 60

Leu Gly Leu Val Ser Leu Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe
65 70 75 80

Gly Met Met Val Ser Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr
85 90 95

Phe Lys Pro Pro Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly
100 105 110

Asp Asp Lys Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile
115 120 125

Gly Glu Thr Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly
130 135 140

Val Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe

```
145                 150                 155                 160

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
                165                 170                 175

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp Asp
            180                 185                 190

Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu Met His
        195                 200                 205

Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu Asn Gln Ile
    210                 215                 220

Gly Asp Tyr Lys Tyr Tyr Phe Asn Ser Asp Gly Val Met Gln Lys Gly
225                 230                 235                 240

Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe Asp Asp Ser Gly Val
                245                 250                 255

Met Lys Val Gly Tyr Thr Glu Ile Asp Gly Lys His Phe Tyr Phe Ala
            260                 265                 270

Glu Asn Gly Glu Met Gln Ile Gly Val Phe Asn Thr Glu Asp Gly Phe
        275                 280                 285

Lys Tyr Phe Ala His His Asn Glu Asp Leu Gly Asn Glu Glu Gly Glu
    290                 295                 300

Glu Ile Ser Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr
305                 310                 315                 320

Phe Asp Asp Ser Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp
                325                 330                 335

Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly
            340                 345                 350

Leu Ser Leu Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile
```

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355 360 365

Met Gln Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser
370 375 380

Asp Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
385 390 395 400

Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
405 410 415

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn
420 425 430

Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val Gly Glu
435 440 445

Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile
450 455 460

Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asn Pro Glu Thr
465 470 475 480

Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp Asp Ile Lys Tyr Tyr
485 490 495

Phe Asp Glu Lys Gly Ile Met Arg Thr Gly Leu Ile Ser Phe Glu Asn
500 505 510

Asn Asn Tyr Tyr Phe Asn Glu Asn Gly Glu Met Gln Phe Gly Tyr Ile
515 520 525

Asn Ile Glu Asp Lys Met Phe Tyr Phe Gly Glu Asp Gly Val Met Gln
530 535 540

Ile Gly Val Phe Asn Thr Pro Asp Gly Phe Lys Tyr Phe Ala His Gln
545 550 555 560

Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly

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565 570 575

Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile
580 585 590

Ala Ala Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp
595 600 605

Pro Asp Thr Ala
610

<210> 451
<211> 612
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 451

Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys Val Ser Gln Val Lys
1 5 10 15

Ile Arg Phe Val Asn Val Phe Lys Asp Lys Thr Leu Ala Asn Lys Leu
20 25 30

Ser Phe Asn Phe Ser Asp Lys Gln Asp Val Pro Val Ser Glu Ile Ile
35 40 45

Leu Ser Phe Thr Pro Ser Tyr Tyr Glu Asp Gly Leu Ile Gly Tyr Asp
50 55 60

Leu Gly Leu Val Ser Leu Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe
65 70 75 80

Gly Met Met Val Ser Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr
85 90 95

Phe Lys Pro Pro Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly
100 105 110

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```
Asp Asp Lys Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile
        115                 120                 125

Gly Glu Thr Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly
    130                 135                 140

Val Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
145                 150                 155                 160

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
                165                 170                 175

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp Asp
            180                 185                 190

Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu Met His
        195                 200                 205

Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu Asn Gln Ile
    210                 215                 220

Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Val Met Gln Lys Gly
225                 230                 235                 240

Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe Asp Asp Ser Gly Val
                245                 250                 255

Met Lys Val Gly Tyr Thr Glu Ile Asp Gly Lys His Phe Tyr Phe Ala
            260                 265                 270

Glu Asn Gly Glu Met Gln Ile Gly Val Phe Asn Thr Glu Asp Gly Phe
        275                 280                 285

Lys Tyr Phe Ala His His Asn Glu Asp Leu Gly Asn Glu Glu Gly Glu
    290                 295                 300

Glu Ile Ser Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr
305                 310                 315                 320
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Phe Asp Asp Ser Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp
                325                 330                 335

Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly
            340                 345                 350

Leu Ser Leu Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile
        355                 360                 365

Met Gln Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser
    370                 375                 380

Asp Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
385                 390                 395                 400

Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
                405                 410                 415

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn
            420                 425                 430

Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val Gly Glu
        435                 440                 445

Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile
    450                 455                 460

Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asn Pro Glu Thr
465                 470                 475                 480

Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp Asp Ile Lys Tyr Tyr
                485                 490                 495

Phe Asp Glu Lys Gly Ile Met Arg Thr Gly Leu Ile Ser Phe Glu Asn
            500                 505                 510

Asn Asn Tyr Tyr Phe Asn Glu Asn Gly Glu Met Gln Phe Gly Tyr Ile
        515                 520                 525
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Asn Ile Glu Asp Lys Met Phe Tyr Phe Gly Glu Asp Gly Val Met Gln
530 535 540

Ile Gly Val Phe Asn Thr Pro Asp Gly Phe Lys Tyr Phe Ala His Gln
545 550 555 560

Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly
565 570 575

Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile
580 585 590

Ala Ala Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp
595 600 605

Pro Asp Thr Ala
610

<210> 452
<211> 612
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 452

Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys Val Ser Gln Val Lys
1 5 10 15

Ile Arg Phe Val Asn Val Phe Lys Asp Lys Thr Leu Ala Asn Lys Leu
20 25 30

Ser Phe Asn Phe Ser Asp Lys Gln Asp Val Pro Val Ser Glu Ile Ile
35 40 45

Leu Ser Phe Thr Pro Ser Tyr Tyr Glu Asp Gly Leu Ile Gly Tyr Asp
50 55 60

Leu Gly Leu Val Ser Leu Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe

65 70 75 80

Gly Met Met Val Ser Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr
85 90 95

Phe Lys Pro Pro Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly
100 105 110

Asp Asp Lys Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile
115 120 125

Gly Glu Thr Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly
130 135 140

Val Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
145 150 155 160

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
165 170 175

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Glu Asp
180 185 190

Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu Met His
195 200 205

Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu Asn Gln Ile
210 215 220

Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Val Met Gln Lys Gly
225 230 235 240

Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe Asp Asp Ser Gly Val
245 250 255

Met Lys Val Gly Tyr Thr Glu Ile Asp Gly Lys His Phe Tyr Phe Ala
260 265 270

Glu Asn Gly Glu Met Gln Ile Gly Val Phe Asn Thr Glu Asp Gly Phe

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275 280 285

Lys Tyr Phe Ala His His Asn Glu Asp Leu Gly Asn Glu Glu Gly Glu
290 295 300

Glu Ile Ser Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr
305 310 315 320

Phe Asp Asp Ser Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp
325 330 335

Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly
340 345 350

Leu Ser Leu Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile
355 360 365

Met Gln Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser
370 375 380

Asp Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
385 390 395 400

Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
405 410 415

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn
420 425 430

Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val Gly Glu
435 440 445

Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile
450 455 460

Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asp Pro Glu Thr
465 470 475 480

Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp Asp Ile Lys Tyr Tyr

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485 490 495

Phe Asp Glu Lys Gly Ile Met Arg Thr Gly Leu Ile Ser Phe Glu Asn
500 505 510

Asn Asn Tyr Tyr Phe Asn Glu Asn Gly Glu Met Gln Phe Gly Tyr Ile
515 520 525

Asn Ile Glu Asp Lys Met Phe Tyr Phe Gly Glu Asp Gly Val Met Gln
530 535 540

Ile Gly Val Phe Asn Thr Pro Asp Gly Phe Lys Tyr Phe Ala His Gln
545 550 555 560

Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly
565 570 575

Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile
580 585 590

Ala Ala Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp
595 600 605

Pro Asp Thr Ala
610

<210> 453
<211> 612
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 453

Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys Val Ser Gln Val Lys
1 5 10 15

Ile Arg Phe Val Asn Val Phe Lys Asp Lys Thr Leu Ala Asn Lys Leu
20 25 30

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```
Ser Phe Asn Phe Ser Asp Lys Gln Asp Val Pro Val Ser Glu Ile Ile
        35                  40                  45

Leu Ser Phe Thr Pro Ser Tyr Tyr Glu Asp Gly Leu Ile Gly Tyr Asp
    50                  55                  60

Leu Gly Leu Val Ser Leu Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe
65                  70                  75                  80

Gly Met Met Val Ser Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr
                85                  90                  95

Phe Lys Pro Pro Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly
            100                 105                 110

Asp Asp Lys Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile
        115                 120                 125

Gly Glu Thr Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly
    130                 135                 140

Val Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
145                 150                 155                 160

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
                165                 170                 175

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp Asp
            180                 185                 190

Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu Met His
        195                 200                 205

Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu Asn Gln Ile
    210                 215                 220

Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Val Met Gln Lys Gly
225                 230                 235                 240
```

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```
Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe Asp Asp Ser Gly Val
                245                 250                 255

Met Lys Val Gly Tyr Thr Glu Ile Asp Gly Lys His Phe Tyr Phe Ala
            260                 265                 270

Glu Asn Gly Glu Met Gln Ile Gly Val Phe Asn Thr Glu Asp Gly Phe
        275                 280                 285

Lys Tyr Phe Ala His His Asn Glu Asp Leu Gly Asn Glu Glu Gly Glu
    290                 295                 300

Glu Ile Ser Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr
305                 310                 315                 320

Phe Asp Asp Ser Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp
                325                 330                 335

Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly
            340                 345                 350

Leu Ser Leu Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile
        355                 360                 365

Met Gln Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser
    370                 375                 380

Asp Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
385                 390                 395                 400

Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
                405                 410                 415

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn
            420                 425                 430

Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val Gly Glu
        435                 440                 445
```

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Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile
450 455 460

Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asn Pro Glu Thr
465 470 475 480

Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp Asp Ile Lys Tyr Tyr
485 490 495

Phe Asp Glu Lys Gly Ile Met Arg Thr Gly Leu Ile Ser Phe Glu Asn
500 505 510

Asn Asn Tyr Tyr Phe Asn Glu Asn Gly Glu Met Gln Phe Gly Tyr Ile
515 520 525

Asn Ile Glu Asp Lys Met Phe Tyr Phe Gly Glu Asp Gly Val Met Gln
530 535 540

Ile Gly Val Phe Asn Thr Pro Asp Gly Phe Lys Tyr Phe Ala His Gln
545 550 555 560

Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly
565 570 575

Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile
580 585 590

Ala Ala Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp
595 600 605

Pro Asp Thr Ala
610

<210> 454
<211> 612
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

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<400> 454

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Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys Val Ser Gln Val Lys
1               5                  10                  15

Ile Arg Phe Val Asn Val Phe Lys Asp Lys Thr Leu Ala Asn Lys Leu
            20                  25                  30

Ser Phe Asn Phe Ser Asp Lys Gln Asp Val Pro Val Ser Glu Ile Ile
        35                  40                  45

Leu Ser Phe Thr Pro Ser Tyr Tyr Glu Asp Gly Leu Ile Gly Tyr Asp
    50                  55                  60

Leu Gly Leu Val Ser Leu Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe
65                  70                  75                  80

Gly Met Met Val Ser Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr
                85                  90                  95

Phe Lys Pro Pro Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly
            100                 105                 110

Asp Asp Lys Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile
        115                 120                 125

Gly Glu Thr Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly
    130                 135                 140

Val Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
145                 150                 155                 160

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
                165                 170                 175

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp Asp
            180                 185                 190

Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu Met His
```

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195 200 205

Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu Asn Gln Ile
210 215 220

Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Val Met Gln Lys Gly
225 230 235 240

Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe Asp Asp Ser Gly Val
245 250 255

Met Lys Val Gly Tyr Thr Glu Ile Asp Gly Lys His Phe Tyr Phe Ala
260 265 270

Glu Asn Gly Glu Met Gln Ile Gly Val Phe Asn Thr Glu Asp Gly Phe
275 280 285

Lys Tyr Phe Ala His His Asn Glu Asp Leu Gly Asn Glu Glu Gly Glu
290 295 300

Glu Ile Ser Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr
305 310 315 320

Phe Asp Asp Ser Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp
325 330 335

Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly
340 345 350

Leu Ser Leu Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile
355 360 365

Met Gln Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser
370 375 380

Asp Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
385 390 395 400

Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr

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405 410 415

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn
420 425 430

Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val Gly Glu
435 440 445

Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile
450 455 460

Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asn Pro Glu Thr
465 470 475 480

Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp Asp Ile Lys Tyr Tyr
485 490 495

Phe Asp Glu Lys Gly Ile Met Arg Thr Gly Leu Ile Ser Phe Glu Asn
500 505 510

Asn Asn Tyr Tyr Phe Asn Glu Asn Gly Glu Met Gln Phe Gly Tyr Ile
515 520 525

Asn Ile Glu Asp Lys Met Phe Tyr Phe Gly Glu Asp Gly Val Met Gln
530 535 540

Ile Gly Val Phe Asn Thr Pro Asp Gly Phe Lys Tyr Phe Ala His Gln
545 550 555 560

Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly
565 570 575

Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile
580 585 590

Ala Ala Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp
595 600 605

Pro Asp Thr Ala

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610

<210> 455
<211> 612
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 455

Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys Val Ser Gln Val Lys
1 5 10 15

Ile Arg Phe Val Asn Val Phe Lys Asp Lys Thr Leu Ala Asn Lys Leu
20 25 30

Ser Phe Asn Phe Ser Asp Lys Gln Asp Val Pro Val Ser Glu Ile Ile
35 40 45

Leu Ser Phe Thr Pro Ser Tyr Tyr Glu Asp Gly Leu Ile Gly Tyr Asp
50 55 60

Leu Gly Leu Val Ser Leu Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe
65 70 75 80

Gly Met Met Val Ser Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr
85 90 95

Phe Lys Pro Pro Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly
100 105 110

Asp Asp Lys Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile
115 120 125

Gly Glu Thr Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly
130 135 140

Val Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
145 150 155 160

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```
Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
                165                 170                 175

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp Asp
            180                 185                 190

Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu Met His
        195                 200                 205

Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu Asn Gln Ile
    210                 215                 220

Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Val Met Gln Lys Gly
225                 230                 235                 240

Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe Asp Asp Ser Gly Val
                245                 250                 255

Met Lys Val Gly Tyr Thr Glu Ile Asp Gly Lys His Phe Tyr Phe Ala
            260                 265                 270

Glu Asn Gly Glu Met Gln Ile Gly Val Phe Asn Thr Glu Asp Gly Phe
        275                 280                 285

Lys Tyr Phe Ala His His Asn Glu Asp Leu Gly Asn Glu Glu Gly Glu
    290                 295                 300

Glu Ile Ser Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr
305                 310                 315                 320

Phe Asp Asp Ser Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp
                325                 330                 335

Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly
            340                 345                 350

Leu Ser Leu Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile
        355                 360                 365
```

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```
Met Gln Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser
    370                 375                 380

Asp Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
385                 390                 395                 400

Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
                405                 410                 415

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn
            420                 425                 430

Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val Gly Glu
        435                 440                 445

Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile
    450                 455                 460

Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asn Pro Glu Thr
465                 470                 475                 480

Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp Asp Ile Lys Tyr Tyr
                485                 490                 495

Phe Asp Glu Lys Gly Ile Met Arg Thr Gly Leu Ile Ser Phe Glu Asn
            500                 505                 510

Asn Asn Tyr Tyr Phe Asn Glu Asn Gly Glu Met Gln Phe Gly Tyr Ile
        515                 520                 525

Asn Ile Glu Asp Lys Met Phe Tyr Phe Gly Glu Asp Gly Val Met Gln
    530                 535                 540

Ile Gly Val Phe Asn Thr Pro Asp Gly Phe Lys Tyr Phe Ala His Gln
545                 550                 555                 560

Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly
                565                 570                 575
```

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Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile
580 585 590

Ala Ala Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp
595 600 605

Pro Asp Thr Ala
610

<210> 456
<211> 612
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 456

Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys Val Ser Gln Val Lys
1 5 10 15

Ile Arg Phe Val Asn Val Phe Lys Asp Lys Thr Leu Ala Asn Lys Leu
20 25 30

Ser Phe Asn Phe Ser Asp Lys Gln Asp Val Pro Val Ser Glu Ile Ile
35 40 45

Leu Ser Phe Thr Pro Ser Tyr Tyr Glu Asp Gly Leu Ile Gly Tyr Asp
50 55 60

Leu Gly Leu Val Ser Leu Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe
65 70 75 80

Gly Met Met Val Ser Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr
85 90 95

Phe Lys Pro Pro Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly
100 105 110

Asp Asp Lys Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile

```
        115                 120                 125

Gly Glu Thr Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly
    130                 135                 140

Val Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
145                 150                 155                 160

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
                165                 170                 175

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp Asp
            180                 185                 190

Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu Met His
        195                 200                 205

Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu Asn Gln Ile
    210                 215                 220

Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Val Met Gln Lys Gly
225                 230                 235                 240

Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe Asp Asp Ser Gly Val
                245                 250                 255

Met Lys Val Gly Tyr Thr Glu Ile Asp Gly Lys His Phe Tyr Phe Ala
            260                 265                 270

Glu Asn Gly Glu Met Gln Ile Gly Val Phe Asn Thr Glu Asp Gly Phe
        275                 280                 285

Lys Tyr Phe Ala His His Asn Glu Asp Leu Gly Asn Glu Glu Gly Glu
    290                 295                 300

Glu Ile Ser Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr
305                 310                 315                 320

Phe Asp Asp Ser Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp
```

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325 330 335

Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly
340 345 350

Leu Ser Leu Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile
355 360 365

Met Gln Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser
370 375 380

Asp Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
385 390 395 400

Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
405 410 415

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn
420 425 430

Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val Gly Glu
435 440 445

Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile
450 455 460

Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asn Pro Glu Thr
465 470 475 480

Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp Asp Ile Lys Tyr Tyr
485 490 495

Phe Asp Glu Lys Gly Ile Met Arg Thr Gly Leu Ile Ser Phe Glu Asn
500 505 510

Asn Asn Tyr Tyr Phe Asn Glu Asn Gly Glu Met Gln Phe Gly Tyr Ile
515 520 525

Asn Ile Glu Asp Lys Met Phe Tyr Phe Gly Glu Asp Gly Val Met Gln

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530 535 540

Ile Gly Val Phe Asn Thr Pro Asp Gly Phe Lys Tyr Phe Ala His Gln
545 550 555 560

Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly
565 570 575

Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile
580 585 590

Ala Ala Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp
595 600 605

Pro Asp Thr Ala
610

<210> 457
<211> 612
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 457

Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys Val Ser Gln Val Lys
1 5 10 15

Ile Arg Phe Val Asn Val Phe Lys Asp Lys Thr Leu Ala Asn Lys Leu
20 25 30

Ser Phe Asn Phe Ser Asp Lys Gln Asp Val Pro Val Ser Glu Ile Ile
35 40 45

Leu Ser Phe Thr Pro Ser Tyr Tyr Glu Asp Gly Leu Ile Gly Tyr Asp
50 55 60

Leu Gly Leu Val Ser Leu Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe
65 70 75 80

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```
Gly Met Met Val Ser Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr
                85                  90                  95

Phe Lys Pro Pro Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly
            100                 105                 110

Asp Asp Lys Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile
        115                 120                 125

Gly Glu Thr Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly
    130                 135                 140

Val Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
145                 150                 155                 160

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
                165                 170                 175

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp Asp
            180                 185                 190

Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu Met His
        195                 200                 205

Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu Asn Gln Ile
    210                 215                 220

Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Val Met Gln Lys Gly
225                 230                 235                 240

Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe Asp Asp Ser Gly Val
                245                 250                 255

Met Lys Val Gly Tyr Thr Glu Ile Asp Gly Lys His Phe Tyr Phe Ala
            260                 265                 270

Glu Asn Gly Glu Met Gln Ile Gly Val Phe Asn Thr Glu Asp Gly Phe
        275                 280                 285
```

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```
Lys Tyr Phe Ala His His Asn Glu Asp Leu Gly Asn Glu Glu Gly Glu
    290                 295                 300

Glu Ile Ser Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr
305                 310                 315                 320

Phe Asp Asp Ser Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp
                325                 330                 335

Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly
            340                 345                 350

Leu Ser Leu Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile
        355                 360                 365

Met Gln Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser
    370                 375                 380

Asp Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
385                 390                 395                 400

Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
                405                 410                 415

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn
            420                 425                 430

Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val Gly Glu
        435                 440                 445

Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile
    450                 455                 460

Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asn Pro Glu Thr
465                 470                 475                 480

Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp Asp Ile Lys Tyr Tyr
                485                 490                 495
```

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Phe Asp Glu Lys Gly Ile Met Arg Thr Gly Leu Ile Ser Phe Glu Asn
500 505 510

Asn Asn Tyr Tyr Phe Asn Glu Asn Gly Glu Met Gln Phe Gly Tyr Ile
515 520 525

Asn Ile Glu Asp Lys Met Phe Tyr Phe Gly Glu Asp Gly Val Met Gln
530 535 540

Ile Gly Val Phe Asn Thr Pro Asp Gly Phe Lys Tyr Phe Ala His Gln
545 550 555 560

Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly
565 570 575

Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile
580 585 590

Ala Ala Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp
595 600 605

Pro Asp Thr Ala
610

<210> 458
<211> 612
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 458

Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys Val Ser Gln Val Lys
1 5 10 15

Ile Arg Phe Val Asn Val Phe Lys Asp Lys Thr Leu Ala Asn Lys Leu
20 25 30

Ser Phe Asn Phe Ser Asp Lys Gln Asp Val Pro Val Ser Glu Ile Ile

```
        35                  40                  45

Leu Ser Phe Thr Pro Ser Tyr Tyr Glu Asp Gly Leu Ile Gly Tyr Asp
    50                  55                  60

Leu Gly Leu Val Ser Leu Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe
65                  70                  75                  80

Gly Met Met Val Ser Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr
                85                  90                  95

Phe Lys Pro Pro Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly
            100                 105                 110

Asp Asp Lys Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile
        115                 120                 125

Gly Glu Thr Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly
    130                 135                 140

Val Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
145                 150                 155                 160

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
                165                 170                 175

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp Asp
            180                 185                 190

Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu Met His
        195                 200                 205

Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu Asn Gln Ile
    210                 215                 220

Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Val Met Gln Lys Gly
225                 230                 235                 240

Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe Asp Asp Ser Gly Val
```

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245 250 255

Met Lys Val Gly Tyr Thr Glu Ile Asp Gly Lys His Phe Tyr Phe Ala
260 265 270

Glu Asn Gly Glu Met Gln Ile Gly Val Phe Asn Thr Glu Asp Gly Phe
275 280 285

Lys Tyr Phe Ala His His Asn Glu Asp Leu Gly Asn Glu Glu Gly Glu
290 295 300

Glu Ile Ser Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr
305 310 315 320

Phe Asp Asp Ser Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp
325 330 335

Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly
340 345 350

Leu Ser Leu Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile
355 360 365

Met Gln Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser
370 375 380

Asp Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
385 390 395 400

Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
405 410 415

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn
420 425 430

Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val Gly Glu
435 440 445

Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile

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450 455 460

Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asn Pro Glu Thr
465 470 475 480

Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp Asp Ile Lys Tyr Tyr
485 490 495

Phe Asp Glu Lys Gly Ile Met Arg Thr Gly Leu Ile Ser Phe Glu Asn
500 505 510

Asn Asn Tyr Tyr Phe Asn Glu Asn Gly Glu Met Gln Phe Gly Tyr Ile
515 520 525

Asn Ile Glu Asp Lys Met Phe Tyr Phe Gly Glu Asp Gly Val Met Gln
530 535 540

Ile Gly Val Phe Asn Thr Pro Asp Gly Phe Lys Tyr Phe Ala His Gln
545 550 555 560

Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly
565 570 575

Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile
580 585 590

Ala Ala Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp
595 600 605

Pro Asp Thr Ala
610

<210> 459
<211> 612
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 459

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Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys Val Ser Gln Val Lys
1               5                  10                  15

Ile Arg Phe Val Asn Val Phe Lys Asp Lys Thr Leu Ala Asn Lys Leu
            20                  25                  30

Ser Phe Asn Phe Ser Asp Lys Gln Asp Val Pro Val Ser Glu Ile Ile
        35                  40                  45

Leu Ser Phe Thr Pro Ser Tyr Tyr Glu Asp Gly Leu Ile Gly Tyr Asp
    50                  55                  60

Leu Gly Leu Val Ser Leu Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe
65                  70                  75                  80

Gly Met Met Val Ser Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr
                85                  90                  95

Phe Lys Pro Pro Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly
            100                 105                 110

Asp Asp Lys Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile
        115                 120                 125

Gly Glu Thr Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly
    130                 135                 140

Val Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
145                 150                 155                 160

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
                165                 170                 175

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Glu Asp
            180                 185                 190

Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu Met His
        195                 200                 205
```

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Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu Asn Gln Ile
210 215 220

Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Val Met Gln Lys Gly
225 230 235 240

Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe Asp Asp Ser Gly Val
245 250 255

Met Lys Val Gly Tyr Thr Glu Ile Asp Gly Lys Tyr Phe Tyr Phe Ala
260 265 270

Glu Asn Gly Glu Met Gln Ile Gly Val Phe Asn Thr Glu Asp Gly Phe
275 280 285

Lys Tyr Phe Ala His His Asn Glu Asp Leu Gly Asn Glu Glu Gly Glu
290 295 300

Glu Ile Ser Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr
305 310 315 320

Phe Asp Asp Ser Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp
325 330 335

Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly
340 345 350

Leu Ser Leu Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile
355 360 365

Met Gln Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser
370 375 380

Asp Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
385 390 395 400

Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
405 410 415

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```
Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn
            420                 425                 430

Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val Gly Glu
        435                 440                 445

Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile
    450                 455                 460

Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asn Pro Glu Thr
465                 470                 475                 480

Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp Asp Ile Lys Tyr Tyr
                485                 490                 495

Phe Asp Glu Lys Gly Ile Met Arg Thr Gly Leu Ile Ser Phe Glu Asn
            500                 505                 510

Asn Asn Tyr Tyr Phe Asn Glu Asn Gly Glu Met Gln Phe Gly Tyr Ile
        515                 520                 525

Asn Ile Glu Asp Lys Met Phe Tyr Phe Gly Glu Asp Gly Val Met Gln
    530                 535                 540

Ile Gly Val Phe Asn Thr Pro Asp Gly Phe Lys Tyr Phe Ala His Gln
545                 550                 555                 560

Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly
                565                 570                 575

Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile
            580                 585                 590

Ala Ala Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp
        595                 600                 605

Pro Asp Thr Ala
    610
```

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<210> 460
<211> 612
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 460

Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys Val Ser Gln Val Lys
1 5 10 15

Ile Arg Phe Val Asn Val Phe Lys Asp Lys Thr Leu Ala Asn Lys Leu
20 25 30

Ser Phe Asn Phe Ser Asp Lys Gln Asp Val Pro Val Ser Glu Ile Ile
35 40 45

Leu Ser Phe Thr Pro Ser Tyr Tyr Glu Asp Gly Leu Ile Gly Tyr Asp
50 55 60

Leu Gly Leu Val Ser Leu Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe
65 70 75 80

Gly Met Met Val Ser Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr
85 90 95

Phe Lys Pro Pro Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly
100 105 110

Asp Asp Lys Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile
115 120 125

Gly Glu Thr Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly
130 135 140

Val Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
145 150 155 160

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp

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165 170 175

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp Asp
180 185 190

Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu Met His
195 200 205

Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu Asn Gln Ile
210 215 220

Gly Asp Tyr Lys Tyr Tyr Phe Asn Ser Asp Gly Val Met Gln Lys Gly
225 230 235 240

Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe Asp Asp Ser Gly Val
245 250 255

Met Lys Val Gly Tyr Thr Glu Ile Asp Gly Lys His Phe Tyr Phe Ala
260 265 270

Glu Asn Gly Glu Met Gln Ile Gly Val Phe Asn Thr Glu Asp Gly Phe
275 280 285

Lys Tyr Phe Ala His His Asn Glu Asp Leu Gly Asn Glu Glu Gly Glu
290 295 300

Glu Ile Ser Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr
305 310 315 320

Phe Asp Asp Ser Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp
325 330 335

Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly
340 345 350

Leu Ser Leu Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile
355 360 365

Met Gln Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser

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370 375 380

Asp Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
385 390 395 400

Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
405 410 415

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn
420 425 430

Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val Gly Glu
435 440 445

Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile
450 455 460

Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asn Pro Glu Thr
465 470 475 480

Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp Asp Ile Lys Tyr Tyr
485 490 495

Phe Asp Glu Lys Gly Ile Met Arg Thr Gly Leu Ile Ser Phe Glu Asn
500 505 510

Asn Asn Tyr Tyr Phe Asn Glu Asn Gly Glu Met Gln Phe Gly Tyr Ile
515 520 525

Asn Ile Glu Asp Lys Met Phe Tyr Phe Gly Glu Asp Gly Val Met Gln
530 535 540

Ile Gly Val Phe Asn Thr Pro Asp Gly Phe Lys Tyr Phe Ala His Gln
545 550 555 560

Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly
565 570 575

Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile

580 585 590

Ala Ala Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp
595 600 605

Pro Asp Thr Ala
610

<210> 461
<211> 612
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 461

Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys Val Ser Gln Val Lys
1 5 10 15

Ile Arg Phe Val Asn Val Phe Lys Asp Lys Thr Leu Ala Asn Lys Leu
20 25 30

Ser Phe Asn Phe Ser Asp Lys Gln Asp Val Pro Val Ser Glu Ile Ile
35 40 45

Ser Ala Phe Thr Pro Ser Tyr Tyr Glu Asp Gly Leu Ile Gly Tyr Asp
50 55 60

Leu Gly Leu Val Ser Leu Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe
65 70 75 80

Gly Met Met Val Ser Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr
85 90 95

Phe Lys Pro Pro Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly
100 105 110

Asp Asp Lys Tyr Tyr Phe Asn Pro Thr Asn Gly Gly Ala Ala Ser Ile
115 120 125

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```
Gly Glu Thr Ile Ile Asn Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly
    130                 135                 140

Ile Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Leu Lys Tyr Phe
145                 150                 155                 160

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
                165                 170                 175

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Glu Asp
            180                 185                 190

Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu Met Tyr
        195                 200                 205

Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu Asn Gln Ile
    210                 215                 220

Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Ile Met Gln Lys Gly
225                 230                 235                 240

Phe Val Ser Ile Asn Asp Lys Lys Tyr Tyr Phe Asp Asp Ser Gly Val
                245                 250                 255

Met Lys Val Gly Tyr Ile Glu Ile Asp Gly Lys Tyr Phe Tyr Phe Ala
            260                 265                 270

Glu Asn Gly Glu Met Gln Ile Gly Val Phe Asn Thr Ser Asp Gly Phe
        275                 280                 285

Lys Tyr Phe Ala His His Asn Glu Asp Leu Gly Asn Glu Glu Gly Glu
    290                 295                 300

Ala Ile Ser Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr
305                 310                 315                 320

Phe Asp Tyr Ser Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp
                325                 330                 335
```

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```
Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Val Gly
            340                 345                 350

Leu Ser Leu Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile
        355                 360                 365

Met Gln Val Gly Phe Val Thr Ile Asn Asn Lys Val Phe Tyr Phe Ser
    370                 375                 380

Asp Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
385                 390                 395                 400

Phe Tyr Ile Asp Glu Lys Gly Ile Val Gln Ile Gly Val Phe Asp Thr
                405                 410                 415

Ser Asp Glu Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn
            420                 425                 430

Ile Tyr Gly Gln Ala Val Asp Tyr Ser Gly Leu Val Arg Val Gly Glu
        435                 440                 445

Asp Ile Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile
    450                 455                 460

Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asn Pro Glu Thr
465                 470                 475                 480

Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp Asp Ile Lys Tyr Tyr
                485                 490                 495

Phe Asp Glu Asn Gly Ile Met Arg Thr Gly Leu Ile Ser Phe Glu Asn
            500                 505                 510

Asn Asp Tyr Tyr Phe Asn Glu Asn Gly Glu Met Gln Phe Gly Tyr Ile
        515                 520                 525

Asn Ile Glu Asp Lys Met Phe Tyr Phe Gly Glu Asp Gly Val Met Gln
    530                 535                 540
```

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Ile Gly Val Phe Asn Thr Gln Asp Gly Phe Lys Tyr Phe Ala His Gln
545 550 555 560

Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly
565 570 575

Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile
580 585 590

Ala Ala Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp
595 600 605

Pro Asp Thr Ala
610

<210> 462
<211> 612
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 462

Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys Val Ser Gln Val Lys
1 5 10 15

Ile Arg Phe Val Asn Val Phe Lys Asp Lys Thr Leu Ala Asn Lys Leu
20 25 30

Ser Phe Asn Phe Ser Asp Lys Gln Asp Val Pro Val Ser Glu Ile Ile
35 40 45

Ser Ala Phe Thr Pro Ser Tyr Tyr Glu Asp Gly Leu Ile Gly Tyr Asp
50 55 60

Leu Gly Leu Val Ser Leu Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe
65 70 75 80

Gly Met Met Val Ser Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr

85 90 95

Phe Lys Pro Pro Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly
100 105 110

Asp Asp Lys Tyr Tyr Phe Asn Pro Thr Asn Gly Gly Ala Ala Ser Ile
115 120 125

Gly Glu Thr Ile Ile Asn Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly
130 135 140

Ile Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Leu Lys Tyr Phe
145 150 155 160

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
165 170 175

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Glu Asp
180 185 190

Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu Met Tyr
195 200 205

Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu Asn Gln Ile
210 215 220

Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Ile Met Gln Lys Gly
225 230 235 240

Phe Val Ser Ile Asn Asp Lys Lys Tyr Tyr Phe Asp Asp Ser Gly Val
245 250 255

Met Lys Val Gly Tyr Ile Glu Ile Asp Gly Lys Tyr Phe Tyr Phe Ala
260 265 270

Glu Asn Gly Glu Met Gln Ile Gly Val Phe Asn Thr Ser Asp Gly Phe
275 280 285

Lys Tyr Phe Ala His His Asn Glu Asp Leu Gly Asn Glu Glu Gly Glu

```
    290                 295                 300

Ala Ile Ser Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr
305                 310                 315                 320

Phe Asp Tyr Ser Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp
                325                 330                 335

Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Val Gly
            340                 345                 350

Leu Ser Leu Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile
        355                 360                 365

Met Gln Val Gly Phe Val Thr Ile Asn Asn Lys Val Phe Tyr Phe Ser
    370                 375                 380

Asp Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
385                 390                 395                 400

Phe Tyr Ile Asp Glu Lys Gly Ile Val Gln Ile Gly Val Phe Asp Thr
                405                 410                 415

Ser Asp Glu Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn
            420                 425                 430

Ile Tyr Gly Gln Ala Val Asp Tyr Ser Gly Leu Val Arg Val Gly Glu
        435                 440                 445

Asp Ile Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile
    450                 455                 460

Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asn Pro Glu Thr
465                 470                 475                 480

Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp Asp Ile Lys Tyr Tyr
                485                 490                 495

Phe Asp Glu Asn Gly Ile Met Arg Thr Gly Leu Ile Ser Phe Glu Asn
```

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500 505 510

Asn Asp Tyr Tyr Phe Asn Glu Asn Gly Glu Met Gln Phe Gly Tyr Ile
515 520 525

Asn Ile Glu Asp Lys Met Phe Tyr Phe Gly Glu Asp Gly Val Met Gln
530 535 540

Ile Gly Val Phe Asn Thr Gln Asp Gly Phe Lys Tyr Phe Ala His Gln
545 550 555 560

Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly
565 570 575

Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile
580 585 590

Ala Ala Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp
595 600 605

Pro Asp Thr Ala
610

<210> 463
<211> 612
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 463

Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys Val Ser Gln Val Lys
1 5 10 15

Ile Arg Phe Val Asn Val Phe Lys Asp Lys Thr Leu Ala Asn Lys Leu
20 25 30

Ser Phe Asn Phe Ser Asp Lys Gln Asp Val Pro Val Ser Glu Ile Ile
35 40 45

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```
Ser Ala Phe Thr Pro Ser Tyr Tyr Glu Asp Gly Leu Ile Gly Tyr Asp
    50                  55                  60

Leu Gly Leu Val Ser Leu Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe
65                  70                  75                  80

Gly Met Met Val Ser Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr
                85                  90                  95

Phe Lys Pro Pro Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly
            100                 105                 110

Asp Asp Lys Tyr Tyr Phe Asn Pro Thr Asn Gly Gly Ala Ala Ser Ile
        115                 120                 125

Gly Glu Thr Ile Ile Asn Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly
    130                 135                 140

Ile Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Leu Lys Tyr Phe
145                 150                 155                 160

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
                165                 170                 175

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Glu Asp
            180                 185                 190

Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu Met Tyr
        195                 200                 205

Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu Asn Gln Ile
    210                 215                 220

Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Ile Met Gln Lys Gly
225                 230                 235                 240

Phe Val Ser Ile Asn Asp Lys Lys Tyr Tyr Phe Asp Asp Ser Gly Val
                245                 250                 255
```

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```
Met Lys Val Gly Tyr Ile Glu Ile Asp Gly Lys Tyr Phe Tyr Phe Ala
            260                 265                 270

Glu Asn Gly Glu Met Gln Ile Gly Val Phe Asn Thr Ser Asp Gly Phe
        275                 280                 285

Lys Tyr Phe Ala His His Asn Glu Asp Leu Gly Asn Glu Glu Gly Glu
    290                 295                 300

Ala Ile Ser Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr
305                 310                 315                 320

Phe Asp Tyr Ser Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp
                325                 330                 335

Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Val Gly
            340                 345                 350

Leu Ser Leu Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile
        355                 360                 365

Met Gln Val Gly Phe Val Thr Ile Asn Asn Lys Val Phe Tyr Phe Ser
    370                 375                 380

Asp Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
385                 390                 395                 400

Phe Tyr Ile Asp Glu Lys Gly Ile Val Gln Ile Gly Val Phe Asp Thr
                405                 410                 415

Ser Asp Glu Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn
            420                 425                 430

Ile Tyr Gly Gln Ala Val Asp Tyr Ser Gly Leu Val Arg Val Gly Glu
        435                 440                 445

Asp Ile Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile
    450                 455                 460
```

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Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asn Pro Glu Thr
465 470 475 480

Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp Asp Ile Lys Tyr Tyr
485 490 495

Phe Asp Glu Asn Gly Ile Met Arg Thr Gly Leu Ile Ser Phe Glu Asn
500 505 510

Asn Asp Tyr Tyr Phe Asn Glu Asn Gly Glu Met Gln Phe Gly Tyr Ile
515 520 525

Asn Ile Glu Asp Lys Met Phe Tyr Phe Gly Glu Asp Gly Val Met Gln
530 535 540

Ile Gly Val Phe Asn Thr Gln Asp Gly Phe Lys Tyr Phe Ala His Gln
545 550 555 560

Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly
565 570 575

Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile
580 585 590

Ala Ala Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp
595 600 605

Pro Asp Thr Ala
610

<210> 464
<211> 612
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 464

Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys Val Ser Gln Val Lys

```
1               5                   10                  15

Ile Arg Phe Val Asn Val Phe Lys Asp Lys Thr Leu Ala Asn Lys Leu
            20                  25                  30

Ser Phe Asn Phe Ser Asp Lys Gln Asp Val Pro Val Ser Glu Ile Ile
        35                  40                  45

Ser Ala Phe Thr Pro Ser Tyr Tyr Glu Asp Gly Leu Ile Gly Tyr Asp
    50                  55                  60

Leu Gly Leu Val Ser Leu Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe
65                  70                  75                  80

Gly Met Met Val Ser Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr
                85                  90                  95

Phe Lys Pro Pro Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly
            100                 105                 110

Asp Asp Lys Tyr Tyr Phe Asn Pro Thr Asn Gly Gly Ala Ala Ser Ile
        115                 120                 125

Gly Glu Thr Ile Ile Asn Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly
    130                 135                 140

Ile Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Leu Lys Tyr Phe
145                 150                 155                 160

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
                165                 170                 175

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Glu Asp
            180                 185                 190

Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu Met Tyr
        195                 200                 205

Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu Asn Gln Ile
```

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210 215 220

Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Ile Met Gln Lys Gly
225 230 235 240

Phe Val Ser Ile Asn Asp Lys Lys Tyr Tyr Phe Asp Asp Ser Gly Val
245 250 255

Met Lys Val Gly Tyr Ile Glu Ile Asp Gly Lys Tyr Phe Tyr Phe Ala
260 265 270

Glu Asn Gly Glu Met Gln Ile Gly Val Phe Asn Thr Ser Asp Gly Phe
275 280 285

Lys Tyr Phe Ala His His Asn Glu Asp Leu Gly Asn Glu Glu Gly Glu
290 295 300

Ala Ile Ser Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr
305 310 315 320

Phe Asp Tyr Ser Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp
325 330 335

Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Val Gly
340 345 350

Leu Ser Leu Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile
355 360 365

Met Gln Val Gly Phe Val Thr Ile Asn Asn Lys Val Phe Tyr Phe Ser
370 375 380

Asp Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
385 390 395 400

Phe Tyr Ile Asp Glu Lys Gly Ile Val Gln Ile Gly Val Phe Asp Thr
405 410 415

Ser Asp Glu Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn

```
            420                 425                 430

Ile Tyr Gly Gln Ala Val Asp Tyr Ser Gly Leu Val Arg Val Gly Glu
        435                 440                 445

Asp Ile Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile
    450                 455                 460

Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asn Pro Glu Thr
465                 470                 475                 480

Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp Asp Ile Lys Tyr Tyr
                485                 490                 495

Phe Asp Glu Asn Gly Ile Met Arg Thr Gly Leu Ile Ser Phe Glu Asn
            500                 505                 510

Asn Asp Tyr Tyr Phe Asn Glu Asn Gly Glu Met Gln Phe Gly Tyr Ile
        515                 520                 525

Asn Ile Glu Asp Lys Met Phe Tyr Phe Gly Glu Asp Gly Val Met Gln
    530                 535                 540

Ile Gly Val Phe Asn Thr Gln Asp Gly Phe Lys Tyr Phe Ala His Gln
545                 550                 555                 560

Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly
                565                 570                 575

Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile
            580                 585                 590

Ala Ala Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp
        595                 600                 605

Pro Asp Thr Ala
    610

<210>  465
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<211> 612
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 465

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Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys Val Ser Gln Val Lys
1               5                  10                  15

Ile Arg Phe Val Asn Val Phe Lys Asp Lys Thr Leu Ala Asn Lys Leu
            20                  25                  30

Ser Phe Asn Phe Ser Asp Lys Gln Asp Val Pro Val Ser Glu Ile Ile
        35                  40                  45

Ser Ala Phe Thr Pro Ser Tyr Tyr Glu Asp Gly Leu Ile Gly Tyr Asp
    50                  55                  60

Leu Gly Leu Val Ser Leu Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe
65                  70                  75                  80

Gly Met Met Val Ser Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr
                85                  90                  95

Phe Lys Pro Pro Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly
            100                 105                 110

Asp Asp Lys Tyr Tyr Phe Asn Pro Thr Asn Gly Gly Ala Ala Ser Ile
        115                 120                 125

Gly Glu Thr Ile Ile Asn Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly
    130                 135                 140

Ile Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Leu Lys Tyr Phe
145                 150                 155                 160

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
                165                 170                 175
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```
Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Glu Asp
            180                 185                 190

Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu Met Tyr
        195                 200                 205

Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu Asn Gln Ile
    210                 215                 220

Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Ile Met Gln Lys Gly
225                 230                 235                 240

Phe Val Ser Ile Asn Asp Lys Lys Tyr Tyr Phe Asp Asp Ser Gly Val
                245                 250                 255

Met Lys Val Gly Tyr Ile Glu Ile Asp Gly Lys Tyr Phe Tyr Phe Ala
            260                 265                 270

Glu Asn Gly Glu Met Gln Ile Gly Val Phe Asn Thr Ser Asp Gly Phe
        275                 280                 285

Lys Tyr Phe Ala His His Asn Glu Asp Leu Gly Asn Glu Glu Gly Glu
    290                 295                 300

Ala Ile Ser Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr
305                 310                 315                 320

Phe Asp Tyr Ser Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp
                325                 330                 335

Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Val Gly
            340                 345                 350

Leu Ser Leu Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile
        355                 360                 365

Met Gln Val Gly Phe Val Thr Ile Asn Asn Lys Val Phe Tyr Phe Ser
    370                 375                 380
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```
Asp Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
385                 390                 395                 400

Phe Tyr Ile Asp Glu Lys Gly Ile Val Gln Ile Gly Val Phe Asp Thr
                405                 410                 415

Ser Asp Glu Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn
            420                 425                 430

Ile Tyr Gly Gln Ala Val Asp Tyr Ser Gly Leu Val Arg Val Gly Glu
        435                 440                 445

Asp Ile Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile
    450                 455                 460

Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asn Pro Glu Thr
465                 470                 475                 480

Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp Asp Ile Lys Tyr Tyr
                485                 490                 495

Phe Asp Glu Asn Gly Ile Met Arg Thr Gly Leu Ile Ser Phe Glu Asn
            500                 505                 510

Asn Asp Tyr Tyr Phe Asn Glu Asn Gly Glu Met Gln Phe Gly Tyr Ile
        515                 520                 525

Asn Ile Glu Asp Lys Met Phe Tyr Phe Gly Glu Asp Gly Val Met Gln
    530                 535                 540

Ile Gly Val Phe Asn Thr Gln Asp Gly Phe Lys Tyr Phe Ala His Gln
545                 550                 555                 560

Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly
                565                 570                 575

Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile
            580                 585                 590
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Ala Ala Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp
595 600 605

Pro Asp Thr Ala
610

<210> 466
<211> 612
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 466

Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys Val Ser Gln Val Lys
1 5 10 15

Ile Arg Phe Val Asn Val Phe Lys Asp Lys Thr Leu Ala Asn Lys Leu
20 25 30

Ser Phe Asn Phe Ser Asp Lys Gln Asp Val Pro Val Ser Glu Ile Ile
35 40 45

Ser Ala Phe Thr Pro Ser Tyr Tyr Glu Asp Gly Leu Ile Gly Tyr Asp
50 55 60

Leu Gly Leu Val Ser Leu Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe
65 70 75 80

Gly Met Met Val Ser Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr
85 90 95

Phe Lys Pro Pro Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly
100 105 110

Asp Asp Lys Tyr Tyr Phe Asn Pro Thr Asn Gly Gly Ala Ala Ser Ile
115 120 125

Gly Glu Thr Ile Ile Asn Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly

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130 135 140

Ile Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Leu Lys Tyr Phe
145 150 155 160

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
165 170 175

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Glu Asp
180 185 190

Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu Met Tyr
195 200 205

Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu Asn Gln Ile
210 215 220

Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Ile Met Gln Lys Gly
225 230 235 240

Phe Val Ser Ile Asn Asp Lys Lys Tyr Tyr Phe Asp Asp Ser Gly Val
245 250 255

Met Lys Val Gly Tyr Ile Glu Ile Asp Gly Lys Tyr Phe Tyr Phe Ala
260 265 270

Glu Asn Gly Glu Met Gln Ile Gly Val Phe Asn Thr Ser Asp Gly Phe
275 280 285

Lys Tyr Phe Ala His His Asn Glu Asp Leu Gly Asn Glu Glu Gly Glu
290 295 300

Ala Ile Ser Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr
305 310 315 320

Phe Asp Tyr Ser Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp
325 330 335

Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Val Gly

340 345 350

Leu Ser Leu Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile
355 360 365

Met Gln Val Gly Phe Val Thr Ile Asn Asn Lys Val Phe Tyr Phe Ser
370 375 380

Asp Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
385 390 395 400

Phe Tyr Ile Asp Glu Lys Gly Ile Val Gln Ile Gly Val Phe Asp Thr
405 410 415

Ser Asp Glu Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn
420 425 430

Ile Tyr Gly Gln Ala Val Asp Tyr Ser Gly Leu Val Arg Val Gly Glu
435 440 445

Asp Ile Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile
450 455 460

Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asn Pro Glu Thr
465 470 475 480

Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp Asp Ile Lys Tyr Tyr
485 490 495

Phe Asp Glu Asn Gly Ile Met Arg Thr Gly Leu Ile Ser Phe Glu Asn
500 505 510

Asn Asp Tyr Tyr Phe Asn Glu Asn Gly Glu Met Gln Phe Gly Tyr Ile
515 520 525

Asn Ile Glu Asp Lys Met Phe Tyr Phe Gly Glu Asp Gly Val Met Gln
530 535 540

Ile Gly Val Phe Asn Thr Gln Asp Gly Phe Lys Tyr Phe Ala His Gln

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545 550 555 560

Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly
565 570 575

Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile
580 585 590

Ala Ala Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp
595 600 605

Pro Asp Thr Ala
610

<210> 467
<211> 612
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 467

Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys Val Ser Gln Val Lys
1 5 10 15

Ile Arg Phe Val Asn Val Phe Lys Asp Lys Thr Leu Ala Asn Lys Leu
20 25 30

Ser Phe Asn Phe Ser Asp Lys Gln Asp Val Pro Val Ser Glu Ile Ile
35 40 45

Ser Ala Phe Thr Pro Ser Tyr Tyr Glu Asp Gly Leu Ile Gly Tyr Asp
50 55 60

Leu Gly Leu Val Ser Leu Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe
65 70 75 80

Gly Met Met Val Ser Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr
85 90 95

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```
Phe Lys Pro Pro Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly
            100                 105                 110

Asp Asp Lys Tyr Tyr Phe Asn Pro Thr Asn Gly Gly Ala Ala Ser Ile
        115                 120                 125

Gly Glu Thr Ile Ile Asn Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly
    130                 135                 140

Ile Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Leu Lys Tyr Phe
145                 150                 155                 160

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
                165                 170                 175

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Glu Asp
            180                 185                 190

Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu Met Tyr
        195                 200                 205

Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu Asn Gln Ile
    210                 215                 220

Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Ile Met Gln Lys Gly
225                 230                 235                 240

Phe Val Ser Ile Asn Asp Lys Lys Tyr Tyr Phe Asp Asp Ser Gly Val
                245                 250                 255

Met Lys Val Gly Tyr Ile Glu Ile Asp Gly Lys Tyr Phe Tyr Phe Ala
            260                 265                 270

Glu Asn Gly Glu Met Gln Ile Gly Val Phe Asn Thr Ser Asp Gly Phe
        275                 280                 285

Lys Tyr Phe Ala His His Asn Glu Asp Leu Gly Asn Glu Glu Gly Glu
    290                 295                 300
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```
Ala Ile Ser Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr
305                 310                 315                 320

Phe Asp Tyr Ser Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp
                325                 330                 335

Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Val Gly
            340                 345                 350

Leu Ser Leu Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile
        355                 360                 365

Met Gln Val Gly Phe Val Thr Ile Asn Asn Lys Val Phe Tyr Phe Ser
    370                 375                 380

Asp Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
385                 390                 395                 400

Phe Tyr Ile Asp Glu Lys Gly Ile Val Gln Ile Gly Val Phe Asp Thr
                405                 410                 415

Ser Asp Glu Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn
            420                 425                 430

Ile Tyr Gly Gln Ala Val Asp Tyr Ser Gly Leu Val Arg Val Gly Glu
        435                 440                 445

Asp Ile Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile
    450                 455                 460

Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asn Pro Glu Thr
465                 470                 475                 480

Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp Asp Ile Lys Tyr Tyr
                485                 490                 495

Phe Asp Glu Asn Gly Ile Met Arg Thr Gly Leu Ile Ser Phe Glu Asn
            500                 505                 510
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Asn Asp Tyr Tyr Phe Asn Glu Asn Gly Glu Met Gln Phe Gly Tyr Ile
515 520 525

Asn Ile Glu Asp Lys Met Phe Tyr Phe Gly Glu Asp Gly Val Met Gln
530 535 540

Ile Gly Val Phe Asn Thr Gln Asp Gly Phe Lys Tyr Phe Ala His Gln
545 550 555 560

Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly
565 570 575

Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile
580 585 590

Ala Ala Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp
595 600 605

Pro Asp Thr Ala
610

<210> 468
<211> 612
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 468

Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys Val Ser Gln Val Lys
1 5 10 15

Ile Arg Phe Val Asn Val Phe Lys Asp Lys Thr Leu Ala Asn Lys Leu
20 25 30

Ser Phe Asn Phe Ser Asp Lys Gln Asp Val Pro Val Ser Glu Ile Ile
35 40 45

Ser Ala Phe Thr Pro Ser Tyr Tyr Glu Asp Gly Leu Ile Gly Tyr Asp

50 55 60

Leu Gly Leu Val Ser Leu Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe
65 70 75 80

Gly Met Met Val Ser Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr
85 90 95

Phe Lys Pro Pro Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly
100 105 110

Asp Asp Lys Tyr Tyr Phe Asn Pro Thr Asn Gly Gly Ala Ala Ser Ile
115 120 125

Gly Glu Thr Ile Ile Asn Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly
130 135 140

Ile Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Leu Lys Tyr Phe
145 150 155 160

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
165 170 175

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Glu Asp
180 185 190

Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu Met Tyr
195 200 205

Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu Asn Gln Ile
210 215 220

Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Ile Met Gln Lys Gly
225 230 235 240

Phe Val Ser Ile Asn Asp Lys Lys Tyr Tyr Phe Asp Asp Ser Gly Val
245 250 255

Met Lys Val Gly Tyr Ile Glu Ile Asp Gly Lys Tyr Phe Tyr Phe Ala

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260 265 270

Glu Asn Gly Glu Met Gln Ile Gly Val Phe Asn Thr Ser Asp Gly Phe
275 280 285

Lys Tyr Phe Ala His His Asn Glu Asp Leu Gly Asn Glu Glu Gly Glu
290 295 300

Ala Ile Ser Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr
305 310 315 320

Phe Asp Tyr Ser Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp
325 330 335

Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Val Gly
340 345 350

Leu Ser Leu Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile
355 360 365

Met Gln Val Gly Phe Val Thr Ile Asn Asn Lys Val Phe Tyr Phe Ser
370 375 380

Asp Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
385 390 395 400

Phe Tyr Ile Asp Glu Lys Gly Ile Val Gln Ile Gly Val Phe Asp Thr
405 410 415

Ser Asp Glu Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn
420 425 430

Ile Tyr Gly Gln Ala Val Asp Tyr Ser Gly Leu Val Arg Val Gly Glu
435 440 445

Asp Ile Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile
450 455 460

Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asn Pro Glu Thr

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465 470 475 480

Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp Asp Ile Lys Tyr Tyr
485 490 495

Phe Asp Glu Asn Gly Ile Met Arg Thr Gly Leu Ile Ser Phe Glu Asn
500 505 510

Asn Asp Tyr Tyr Phe Asn Glu Asn Gly Glu Met Gln Phe Gly Tyr Ile
515 520 525

Asn Ile Glu Asp Lys Met Phe Tyr Phe Gly Glu Asp Gly Val Met Gln
530 535 540

Ile Gly Val Phe Asn Thr Gln Asp Gly Phe Lys Tyr Phe Ala His Gln
545 550 555 560

Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly
565 570 575

Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile
580 585 590

Ala Ala Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp
595 600 605

Pro Asp Thr Ala
610

<210> 469
<211> 612
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 469

Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys Val Ser Gln Val Lys
1 5 10 15

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Ile Arg Phe Val Asn Val Phe Lys Asp Lys Thr Leu Ala Asn Lys Leu
            20                  25                  30

Ser Phe Asn Phe Ser Asp Lys Gln Asp Val Pro Val Ser Glu Ile Ile
        35                  40                  45

Ser Ala Phe Thr Pro Ser Tyr Tyr Glu Asp Gly Leu Ile Gly Tyr Asp
    50                  55                  60

Leu Gly Leu Val Ser Leu Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe
65                  70                  75                  80

Gly Met Met Val Ser Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr
                85                  90                  95

Phe Lys Pro Pro Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly
            100                 105                 110

Asp Asp Lys Tyr Tyr Phe Asn Pro Thr Asn Gly Gly Ala Ala Ser Ile
        115                 120                 125

Gly Glu Thr Ile Ile Asn Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly
    130                 135                 140

Ile Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Leu Lys Tyr Phe
145                 150                 155                 160

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
                165                 170                 175

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Glu Asp
            180                 185                 190

Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu Met Tyr
        195                 200                 205

Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu Asn Gln Ile
    210                 215                 220
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```
Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Ile Met Gln Lys Gly
225                 230                 235                 240

Phe Val Ser Ile Asn Asp Lys Lys Tyr Tyr Phe Asp Asp Ser Gly Val
                245                 250                 255

Met Lys Val Gly Tyr Ile Glu Ile Asp Gly Lys Tyr Phe Tyr Phe Ala
            260                 265                 270

Glu Asn Gly Glu Met Gln Ile Gly Val Phe Asn Thr Ser Asp Gly Phe
        275                 280                 285

Lys Tyr Phe Ala His His Asn Glu Asp Leu Gly Asn Glu Glu Gly Glu
    290                 295                 300

Ala Ile Ser Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr
305                 310                 315                 320

Phe Asp Tyr Ser Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp
                325                 330                 335

Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Val Gly
            340                 345                 350

Leu Ser Leu Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile
        355                 360                 365

Met Gln Val Gly Phe Val Thr Ile Asn Asn Lys Val Phe Tyr Phe Ser
    370                 375                 380

Asp Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
385                 390                 395                 400

Phe Tyr Ile Asp Glu Lys Gly Ile Val Gln Ile Gly Val Phe Asp Thr
                405                 410                 415

Ser Asp Glu Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn
            420                 425                 430
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Ile Tyr Gly Gln Ala Val Asp Tyr Ser Gly Leu Val Arg Val Gly Glu
435 440 445

Asp Ile Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile
450 455 460

Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asn Pro Glu Thr
465 470 475 480

Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp Asp Ile Lys Tyr Tyr
485 490 495

Phe Asp Glu Asn Gly Ile Met Arg Thr Gly Leu Ile Ser Phe Glu Asn
500 505 510

Asn Asp Tyr Tyr Phe Asn Glu Asn Gly Glu Met Gln Phe Gly Tyr Ile
515 520 525

Asn Ile Glu Asp Lys Met Phe Tyr Phe Gly Glu Asp Gly Val Met Gln
530 535 540

Ile Gly Val Phe Asn Thr Gln Asp Gly Phe Lys Tyr Phe Ala His Gln
545 550 555 560

Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly
565 570 575

Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile
580 585 590

Ala Ala Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp
595 600 605

Pro Asp Thr Ala
610

<210> 470
<211> 612
<212> PRT

17 Jun 2019
2013333532

<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 470

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Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys Val Ser Gln Val Lys
1               5                  10                  15

Ile Arg Phe Val Asn Val Phe Lys Asp Lys Thr Leu Ala Asn Lys Leu
            20                  25                  30

Ser Phe Asn Phe Ser Asp Lys Gln Asp Val Pro Val Ser Glu Ile Ile
        35                  40                  45

Ser Ala Phe Thr Pro Ser Tyr Tyr Glu Asp Gly Leu Ile Gly Tyr Asp
    50                  55                  60

Leu Gly Leu Val Ser Leu Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe
65                  70                  75                  80

Gly Met Met Val Ser Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr
                85                  90                  95

Phe Lys Pro Pro Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly
            100                 105                 110

Asp Asp Lys Tyr Tyr Phe Asn Pro Thr Asn Gly Gly Ala Ala Ser Ile
        115                 120                 125

Gly Glu Thr Ile Ile Asn Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly
    130                 135                 140

Ile Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Leu Lys Tyr Phe
145                 150                 155                 160

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
                165                 170                 175

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Glu Asp
```

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```
            180                 185                 190

Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu Met Tyr
        195                 200                 205

Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu Asn Gln Ile
    210                 215                 220

Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Ile Met Gln Lys Gly
225                 230                 235                 240

Phe Val Ser Ile Asn Asp Lys Lys Tyr Tyr Phe Asp Asp Ser Gly Val
                245                 250                 255

Met Lys Val Gly Tyr Ile Glu Ile Asp Gly Lys Tyr Phe Tyr Phe Ala
            260                 265                 270

Glu Asn Gly Glu Met Gln Ile Gly Val Phe Asn Thr Ser Asp Gly Phe
        275                 280                 285

Lys Tyr Phe Ala His His Asn Glu Asp Leu Gly Asn Glu Glu Gly Glu
    290                 295                 300

Ala Ile Ser Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr
305                 310                 315                 320

Phe Asp Tyr Ser Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp
                325                 330                 335

Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Val Gly
            340                 345                 350

Leu Ser Leu Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile
        355                 360                 365

Met Gln Val Gly Phe Val Thr Ile Asn Asn Lys Val Phe Tyr Phe Ser
    370                 375                 380

Asp Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
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385 390 395 400

Phe Tyr Ile Asp Glu Lys Gly Ile Val Gln Ile Gly Val Phe Asp Thr
405 410 415

Ser Asp Glu Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn
420 425 430

Ile Tyr Gly Gln Ala Val Asp Tyr Ser Gly Leu Val Arg Val Gly Glu
435 440 445

Asp Ile Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile
450 455 460

Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asn Pro Glu Thr
465 470 475 480

Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp Asp Ile Lys Tyr Tyr
485 490 495

Phe Asp Glu Asn Gly Ile Met Arg Thr Gly Leu Ile Ser Phe Glu Asn
500 505 510

Asn Asp Tyr Tyr Phe Asn Glu Asn Gly Glu Met Gln Phe Gly Tyr Ile
515 520 525

Asn Ile Glu Asp Lys Met Phe Tyr Phe Gly Glu Asp Gly Val Met Gln
530 535 540

Ile Gly Val Phe Asn Thr Gln Asp Gly Phe Lys Tyr Phe Ala His Gln
545 550 555 560

Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly
565 570 575

Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile
580 585 590

Ala Ala Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp

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595 600 605

Pro Asp Thr Ala
610

<210> 471
<211> 612
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 471

Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys Val Ser Gln Val Lys
1 5 10 15

Ile Arg Phe Val Asn Val Phe Lys Asp Lys Thr Leu Ala Asn Lys Leu
20 25 30

Ser Phe Asn Phe Ser Asp Lys Gln Asp Val Pro Val Ser Glu Ile Ile
35 40 45

Leu Ser Phe Thr Pro Ser Tyr Tyr Glu Asp Gly Leu Ile Gly Tyr Asp
50 55 60

Leu Gly Leu Val Ser Leu Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe
65 70 75 80

Gly Met Met Val Ser Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr
85 90 95

Phe Lys Pro Pro Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly
100 105 110

Asp Asp Lys Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile
115 120 125

Gly Glu Thr Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly
130 135 140

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```
Val Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
145                 150                 155                 160

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
                165                 170                 175

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp Asp
            180                 185                 190

Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu Met His
        195                 200                 205

Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu Asn Gln Ile
    210                 215                 220

Gly Asp Tyr Lys Tyr Tyr Phe Asn Ser Asp Gly Val Met Gln Lys Gly
225                 230                 235                 240

Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe Asp Asp Ser Gly Val
                245                 250                 255

Met Lys Val Gly Tyr Thr Glu Ile Asp Gly Lys His Phe Tyr Phe Ala
            260                 265                 270

Glu Asn Gly Glu Met Gln Ile Gly Val Phe Asn Thr Glu Asp Gly Phe
        275                 280                 285

Lys Tyr Phe Ala His His Asn Glu Asp Leu Gly Asn Glu Glu Gly Glu
    290                 295                 300

Glu Ile Ser Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr
305                 310                 315                 320

Phe Asp Asp Ser Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp
                325                 330                 335

Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly
            340                 345                 350
```

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```
Leu Ser Leu Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile
        355                 360                 365

Met Gln Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser
    370                 375                 380

Asp Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
385                 390                 395                 400

Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
                405                 410                 415

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn
            420                 425                 430

Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val Gly Glu
        435                 440                 445

Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile
    450                 455                 460

Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asn Pro Glu Thr
465                 470                 475                 480

Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp Asp Ile Lys Tyr Tyr
                485                 490                 495

Phe Asp Glu Lys Gly Ile Met Arg Thr Gly Leu Ile Ser Phe Glu Asn
            500                 505                 510

Asn Asn Tyr Tyr Phe Asn Glu Asn Gly Glu Met Gln Phe Gly Tyr Ile
        515                 520                 525

Asn Ile Glu Asp Lys Met Phe Tyr Phe Gly Glu Asp Gly Val Met Gln
    530                 535                 540

Ile Gly Val Phe Asn Thr Pro Asp Gly Phe Lys Tyr Phe Ala His Gln
545                 550                 555                 560
```

Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly
565 570 575

Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile
580 585 590

Ala Ala Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp
595 600 605

Pro Asp Thr Ala
610

<210> 472
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 472

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr

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```
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Pro Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
```

305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln

515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 473
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 473

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
130 135 140

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```
Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350
```

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Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 474
<211> 540
<212> PRT

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<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 474

```
Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1               5                  10                  15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
            20                  25                  30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
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180 185 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
195 200 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
210 215 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225 230 235 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Pro Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln

385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 475
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 475

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

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```
Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
            20                  25                  30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220
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```
Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430
```

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Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 476
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 476

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser

50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
130 135 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145 150 155 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
165 170 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
180 185 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
195 200 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
210 215 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225 230 235 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu

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260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile

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465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 477
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 477

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

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```
His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300
```

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```
Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510
```

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```
Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
    530                 535                 540

<210>  478
<211>  540
<212>  PRT
<213>  Artificial Sequence

<220>
<223>  Synthetic amino acid sequence

<400>  478

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1               5                   10                  15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
            20                  25                  30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
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130 135 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145 150 155 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
165 170 175

Ile Tyr Asp Arg Gln Lys Arg Phe Val Asn Tyr Tyr Lys Ser Gln Ile
180 185 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
195 200 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
210 215 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225 230 235 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser

340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 479

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<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 479

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Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1               5                  10                  15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
            20                  25                  30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175
```

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```
Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380
```

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Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 480
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 480

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg

```
1               5                   10                  15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
            20                  25                  30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Val Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
```

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210 215 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225 230 235 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser

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420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 481
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 481

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

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```
Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255
```

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```
Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Pro Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460
```

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Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 482
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 482

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu

```
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
```

290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln

500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 483
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 483

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

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```
Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335
```

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```
Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
    530                 535                 540
```

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<210> 484
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 484

```
Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1               5                  10                  15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
            20                  25                  30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
```

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165 170 175

Ile Tyr Asp Arg Gln Lys Arg Phe Val Asn Tyr Tyr Lys Ser Gln Ile
180 185 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
195 200 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
210 215 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225 230 235 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala

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370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 485
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 485

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```
Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1               5                  10                  15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
            20                  25                  30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205
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Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415
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Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 486
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 486

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys

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        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Val Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
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245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile

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450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 487
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 487

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

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```
Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Thr Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met Leu
        275                 280                 285
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Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495
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Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 488
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 488

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp

```
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Thr Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
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325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser

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530 535 540

<210> 489
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 489

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
130 135 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145 150 155 160

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```
Asn Pro Gln Phe Asp Asn Thr Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365
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Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 490
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

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<400> 490

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
130 135 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145 150 155 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
165 170 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
180 185 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu

195 200 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
210 215 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225 230 235 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile

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405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 491
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 491

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

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```
Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240
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```
Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445
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Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 492
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 492

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu

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65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
130 135 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145 150 155 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
165 170 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
180 185 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
195 200 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
210 215 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225 230 235 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met Leu

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275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu

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485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 493
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 493

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

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Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
130 135 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145 150 155 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
165 170 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
180 185 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
195 200 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
210 215 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225 230 235 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

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```
Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525
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Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 494
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 494

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
130 135 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln

```
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Pro Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
```

355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 495
<211> 540
<212> PRT
<213> Artificial Sequence

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<220>
<223> Synthetic amino acid sequence

<400> 495

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Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1               5                  10                  15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
            20                  25                  30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190
```

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```
Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400
```

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Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 496
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 496

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr

```
            20                  25                  30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
```

225 230 235 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile

435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 497
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 497

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

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```
Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270
```

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```
Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480
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Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 498
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 498

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr

```
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Gly
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
```

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305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln

515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 499
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 499

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
130 135 140

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```
Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350
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```
Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
    530                 535                 540


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<211>  540
<212>  PRT
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<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 500

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Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1               5                  10                  15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
            20                  25                  30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
```

180 185 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
195 200 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
210 215 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225 230 235 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln

385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 501
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 501

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

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```
Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
            20                  25                  30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220
```

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```
Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430
```

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Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 502
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 502

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser

50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
130 135 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145 150 155 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
165 170 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
180 185 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
195 200 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
210 215 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225 230 235 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu

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260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile

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465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 503
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 503

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

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```
His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300
```

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```
Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510
```

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Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 504
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 504

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val

```
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
```

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340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 505

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<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 505

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Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1               5                  10                  15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
            20                  25                  30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175
```

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```
Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380
```

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Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 506
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 506

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg

```
1               5                   10                  15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
            20                  25                  30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
```

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210 215 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225 230 235 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser

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420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 507
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 507

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

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```
Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255
```

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```
Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460
```

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Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 508
<211> 540
<212> PRT
<213> Artificial Sequence

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<223> Synthetic amino acid sequence

<400> 508

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu

```
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
```

290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln

500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 509
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 509

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

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```
Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Val Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335
```

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```
Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
    530                 535                 540
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<210> 510
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 510

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
130 135 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145 150 155 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe

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165 170 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
180 185 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
195 200 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
210 215 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225 230 235 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala

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370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 511
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 511

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```
Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1               5                  10                  15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
            20                  25                  30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Val Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205
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```
Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415
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Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 512
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 512

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys

```
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
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245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile

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450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 513
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 513

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

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```
Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Val Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met Leu
        275                 280                 285
```

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```
Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495
```

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Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 514
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 514

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp

```
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Val Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
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325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser

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530 535 540

<210> 515
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 515

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
130 135 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145 150 155 160

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```
Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Val Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365
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Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 516
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

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<400> 516

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
130 135 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145 150 155 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
165 170 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
180 185 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu

195 200 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
210 215 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225 230 235 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Gly
245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile

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405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 517
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 517

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

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```
Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Val Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240
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```
Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445
```

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Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 518
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 518

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu

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65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
130 135 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145 150 155 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
165 170 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
180 185 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
195 200 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
210 215 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225 230 235 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met Leu

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275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu

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485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 519
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 519

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

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```
Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320
```

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```
Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525
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Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 520
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 520

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
130 135 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln

```
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Ala Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Pro Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
```

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355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 521
<211> 540
<212> PRT
<213> Artificial Sequence

17 Jun 2019
2013333532

<220>
<223> Synthetic amino acid sequence

<400> 521

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Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1               5                  10                  15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
            20                  25                  30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190
```

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```
Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Ala Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400
```

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Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 522
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 522

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr

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20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
130 135 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145 150 155 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
165 170 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
180 185 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
195 200 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
210 215 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala

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225 230 235 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Ala Leu Ala Val Ala Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Pro Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile

435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 523
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 523

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

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```
Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270
```

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```
Leu Ala Leu Lys Asn Phe Gly Gly Val Ala Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480
```

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Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 524
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 524

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr

```
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Ala Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
```

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```
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
```

515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 525
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 525

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
130 135 140

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```
Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Ala Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350
```

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```
Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
    530                 535                 540


<210>  526
<211>  540
<212>  PRT
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<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 526

```
Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1               5                  10                  15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
            20                  25                  30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Val Asn Tyr Tyr Lys Ser Gln Ile
```

180 185 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
195 200 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
210 215 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225 230 235 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Ala Leu Ala Val Ala Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln

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385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 527
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 527

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

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```
Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
            20                  25                  30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220
```

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```
Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Ala Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430
```

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Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 528
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 528

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser

```
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Val Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
```

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260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Ala Leu Ala Val Ala Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile

465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

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Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

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```
His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Ala Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Pro Arg Pro Ser Ser
    290                 295                 300
```

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```
Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510
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Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

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<212> PRT
<213> Artificial Sequence

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<223> Synthetic amino acid sequence

<400> 530

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val

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130 135 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145 150 155 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
165 170 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
180 185 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
195 200 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
210 215 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225 230 235 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Ala Leu Ala Val Ala Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser

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340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 531

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<211> 540
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<223> Synthetic amino acid sequence

<400> 531

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Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1               5                  10                  15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
            20                  25                  30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175
```

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```
Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Ala Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380
```

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Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 532
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 532

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg

```
1               5                   10                  15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
            20                  25                  30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Val Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
```

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210 215 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225 230 235 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Ala Leu Ala Val Ala Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser

420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 533
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 533

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

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```
Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255
```

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```
Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Ala Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460
```

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Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 534
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 534

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu

```
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Val Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Ala Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
```

```
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
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500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 535
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 535

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

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```
Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Thr Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Ala Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335
```

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```
Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
    530                 535                 540
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Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
130 135 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145 150 155 160

Asn Pro Gln Phe Asp Asn Thr Lys Phe Tyr Lys Lys Arg Met Glu Phe

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165 170 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
180 185 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
195 200 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
210 215 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225 230 235 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Ala Leu Ala Val Ala Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala

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370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

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<211> 540
<212> PRT
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Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1               5                  10                  15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
            20                  25                  30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Thr Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205
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```
Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Ala Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415
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Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 538
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<212> PRT
<213> Artificial Sequence

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<223> Synthetic amino acid sequence

<400> 538

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys

```
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
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245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Ala Leu Ala Val Ala Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile

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450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

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<212> PRT
<213> Artificial Sequence

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<223> Synthetic amino acid sequence

<400> 539

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

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```
Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Ala Leu Ala Val Ala Met Leu
        275                 280                 285
```

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```
Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495
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Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 540
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 540

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp

```
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Ala Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
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325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser

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530 535 540

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<211> 540
<212> PRT
<213> Artificial Sequence

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<223> Synthetic amino acid sequence

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Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
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Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
130 135 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145 150 155 160

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```
Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Ala Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365
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Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 542
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

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<400> 542

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
130 135 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145 150 155 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
165 170 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
180 185 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu

195 200 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
210 215 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225 230 235 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Ala Leu Ala Val Ala Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Pro Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile

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405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 543
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 543

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

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```
Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240
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Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Ala Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445
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Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 544
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<212> PRT
<213> Artificial Sequence

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<400> 544

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu

65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
130 135 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145 150 155 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
165 170 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
180 185 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
195 200 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
210 215 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225 230 235 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Ala Leu Ala Val Ala Met Leu

275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu

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485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 545
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 545

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

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```
Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Ala Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320
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```
Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525
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Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 546
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 546

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
130 135 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln

```
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Gly
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Ala Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
```

355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 547
<211> 540
<212> PRT
<213> Artificial Sequence

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<220>
<223> Synthetic amino acid sequence

<400> 547

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Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1               5                  10                  15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
            20                  25                  30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190
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```
Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Ala Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400
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Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 548
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 548

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr

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20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
130 135 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145 150 155 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
165 170 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
180 185 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
195 200 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
210 215 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala

225 230 235 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Ala Leu Ala Val Ala Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile

435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 549
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 549

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

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```
Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270
```

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```
Leu Ala Leu Lys Asn Phe Gly Gly Val Ala Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480
```

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Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 550
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 550

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr

```
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Ala Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
```

305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln

515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 551
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 551

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
130 135 140

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```
Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Ala Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350
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Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 552
<211> 540
<212> PRT

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<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 552

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Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1               5                  10                  15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
            20                  25                  30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
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180 185 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
195 200 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
210 215 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225 230 235 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Ala Leu Ala Val Ala Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln

385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 553
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 553

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

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```
Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
            20                  25                  30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220
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```
Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Ala Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430
```

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Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 554
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 554

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser

50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
130 135 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145 150 155 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
165 170 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
180 185 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
195 200 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
210 215 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225 230 235 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu

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260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Ala Leu Ala Val Ala Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile

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465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 555
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 555

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

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```
His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Ala Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300
```

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```
Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510
```

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Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 556
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 556

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val

```
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Ala Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
```

340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 557

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<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 557

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Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1               5                  10                  15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
            20                  25                  30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175
```

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```
Ile Tyr Asp Arg Gln Lys Arg Phe Val Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Ala Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380
```

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Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 558
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 558

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg

```
1               5                   10                  15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
            20                  25                  30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
```

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210 215 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225 230 235 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Ala Leu Ala Val Ala Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser

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420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 559
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 559

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

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```
Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Val Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255
```

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```
Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Ala Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460
```

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Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 560
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 560

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu

```
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Ala Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
```

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290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln

500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 561
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 561

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

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```
Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Val Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Ala Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335
```

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```
Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
    530                 535                 540
```

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<210> 562
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 562

```
Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1               5                  10                  15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
            20                  25                  30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
```

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165 170 175

Ile Tyr Asp Arg Gln Lys Arg Phe Val Asn Tyr Tyr Lys Ser Gln Ile
180 185 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
195 200 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
210 215 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225 230 235 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Ala Leu Ala Val Ala Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala

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370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 563
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 563

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```
Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1               5                  10                  15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
            20                  25                  30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Val Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205
```

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```
Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Ala Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415
```

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Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 564
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 564

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys

```
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Gly
```

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245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Ala Leu Ala Val Ala Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile

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450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 565
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 565

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

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```
Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Val Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Ala Leu Ala Val Ala Met Leu
        275                 280                 285
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```
Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495
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Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 566
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 566

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp

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115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
130 135 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145 150 155 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
165 170 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
180 185 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
195 200 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
210 215 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225 230 235 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Ala Leu Ala Val Ala Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu

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325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser

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530 535 540

<210> 567
<211> 540
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 567

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
130 135 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145 150 155 160

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```
Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Ala Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365
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Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser
530 535 540

<210> 568
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

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<400> 568

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Val Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
130 135 140

Val Glu Ser Ala Thr Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145 150 155 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Tyr Arg Lys Arg Met Glu
165 170 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Thr Gln
180 185 190

Arg Glu Glu Asn Pro Asp Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr

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195 200 205

Leu Ser Asn Glu Tyr Ser Lys Asp Ile Asp Glu Leu Asn Ser Tyr Ile
210 215 220

Glu Glu Ser Leu Asn Lys Val Thr Glu Asn Ser Gly Asn Asp Val Arg
225 230 235 240

Asn Phe Glu Glu Phe Lys Gly Gly Glu Ser Phe Lys Leu Tyr Glu Gln
245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
260 265 270

Ile Ser Ala Leu Lys Glu Val Gly Gly Val Tyr Leu Asp Val Asp Met
275 280 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
290 295 300

Ser Val Thr Val Asp Phe Trp Glu Met Val Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala

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405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Ala Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Lys Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 569
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 569

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

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```
Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240
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```
Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445
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Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 570
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 570

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Val Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr

65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
130 135 140

Val Glu Ser Ala Thr Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145 150 155 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Tyr Arg Lys Arg Met Glu
165 170 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Thr Gln
180 185 190

Arg Glu Glu Asn Pro Asp Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
195 200 205

Leu Ser Asn Glu Tyr Ser Lys Asp Ile Asp Glu Leu Asn Ser Tyr Ile
210 215 220

Glu Glu Ser Leu Asn Lys Val Thr Glu Asn Ser Gly Asn Asp Val Arg
225 230 235 240

Asn Phe Glu Glu Phe Lys Gly Gly Glu Ser Phe Lys Leu Tyr Glu Gln
245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
260 265 270

Ile Ser Ala Leu Lys Glu Val Gly Gly Val Tyr Leu Asp Val Asp Met

275 280 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
290 295 300

Ser Val Thr Val Asp Phe Trp Glu Met Val Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Ala Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp

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485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Lys Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 571
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 571

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

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```
Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320
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```
Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
        515                 520                 525
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Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 572
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 572

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
130 135 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu

```
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
```

355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 573
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 573

```
Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1               5                  10                  15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
            20                  25                  30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190
```

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```
Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400
```

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Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 574
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 574

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu

```
            20                  25                  30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val Arg
```

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225 230 235 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu Gln
245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
260 265 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp Met
275 280 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
290 295 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu

435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Thr Phe Asp Asp Ala Arg Ala Lys Val
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 575
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 575

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

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```
Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270
```

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```
Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480
```

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Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 576
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 576

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn

```
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
```

305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Thr Phe Asp Asp Ala Arg Ala Lys Val

515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 577
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 577

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Val Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
130 135 140

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```
Val Glu Ser Ala Thr Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Tyr Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Thr Gln
            180                 185                 190

Arg Glu Glu Asn Pro Asp Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Asp Ile Asp Glu Leu Asn Ser Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Val Thr Glu Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Gly Gly Glu Ser Phe Lys Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Val Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Val Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350
```

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Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Ala Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Lys Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 578
<211> 542
<212> PRT

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<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 578

```
Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1               5                  10                  15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
            20                  25                  30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
```

```
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
```

385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Phe Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 579
<211> 543
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 579

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

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```
Arg Val Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
            20                  25                  30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Thr Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Ile
65                  70                  75                  80

Glu Ile Leu Glu Leu Lys Asn Ser Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Ile Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Ile Glu Ser Ala Ser Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Glu Phe Asn His Thr Ala Phe Phe Arg Lys Arg Met Gln
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Gln Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Lys Glu Glu Asn Pro Asp Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Asp Ile Asp Glu Leu Asn Ala Tyr Ile
    210                 215                 220
```

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```
Glu Glu Ser Leu Asn Lys Val Thr Glu Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Thr Gly Glu Val Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Gly Ala Ser Asp Ile Leu Arg
            260                 265                 270

Val Ala Ile Leu Lys Asn Ile Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile His Pro Asp Leu Phe Lys Asp Ile Asn Lys Pro Asp
    290                 295                 300

Ser Val Lys Thr Ala Val Asp Trp Glu Glu Met Gln Leu Glu Ala Ile
305                 310                 315                 320

Met Lys His Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Lys His Phe Asp
                325                 330                 335

Thr Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
            340                 345                 350

Lys Ser Asp Lys Ser Glu Ile Phe Leu Pro Leu Gly Asp Ile Glu Val
        355                 360                 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Ala Lys Gly Ser Ile Ile Asn
    370                 375                 380

Gln Ala Leu Ile Ser Ala Lys Asp Ser Tyr Cys Ser Asp Leu Leu Ile
385                 390                 395                 400

Lys Gln Ile Gln Asn Arg Tyr Lys Ile Leu Asn Asp Thr Leu Gly Pro
                405                 410                 415

Ile Ile Ser Gln Gly Asn Asp Phe Asn Thr Thr Met Asn Asn Phe Gly
            420                 425                 430
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Glu Ser Leu Gly Ala Ile Ala Asn Glu Glu Asn Ile Ser Phe Ile Ala
435 440 445

Lys Ile Gly Ser Tyr Leu Arg Val Gly Phe Tyr Pro Glu Ala Asn Thr
450 455 460

Thr Ile Thr Leu Ser Gly Pro Thr Ile Tyr Ala Gly Ala Tyr Lys Asp
465 470 475 480

Leu Leu Thr Phe Lys Glu Met Ser Ile Asp Thr Ser Ile Leu Ser Ser
485 490 495

Glu Leu Arg Asn Phe Glu Phe Pro Lys Val Asn Ile Ser Gln Ala Thr
500 505 510

Glu Gln Glu Lys Asn Ser Leu Trp Gln Phe Asn Glu Glu Arg Ala Lys
515 520 525

Ile Gln Phe Glu Glu Tyr Lys Lys Asn Tyr Phe Glu Gly Ala Leu
530 535 540

<210> 580
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 580

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys

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```
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
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260 265 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp Met
275 280 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
290 295 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu

465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 581
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 581

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

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```
Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300
```

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```
Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510
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Gln Glu Met Ala Ser Leu Trp Thr Phe Asp Asp Ala Arg Ala Lys Val
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 582
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 582

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val

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130 135 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145 150 155 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
165 170 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
180 185 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
195 200 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
210 215 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225 230 235 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
260 265 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp Met
275 280 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
290 295 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys

340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 583

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<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 583

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Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1               5                  10                  15


Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
            20                  25                  30


Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45


Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60


Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80


Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95


Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110


Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125


Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140


Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160


Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175
```

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```
Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380
```

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Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Thr Phe Asp Asp Ala Arg Ala Lys Val
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 584
<211> 543
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 584

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe

```
1               5                   10                  15

Arg Val Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
            20                  25                  30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Thr Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Ile Leu Glu Leu Lys Asn Ser Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Ile Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Ile Glu Ser Ala Ser Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Glu Phe Asn His Thr Ala Phe Phe Arg Lys Arg Met Gln
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Gln Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Lys Glu Glu Asn Pro Asp Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Asp Ile Asp Glu Leu Asn Ala Tyr Ile
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210 215 220

Glu Glu Ser Leu Asn Lys Val Thr Glu Asn Ser Gly Asn Asp Val Arg
225 230 235 240

Asn Phe Glu Glu Phe Lys Thr Gly Glu Val Phe Asn Leu Tyr Glu Gln
245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Gly Ala Ser Asp Ile Leu Arg
260 265 270

Val Ala Ile Leu Lys Asn Ile Gly Gly Val Tyr Leu Asp Val Asp Met
275 280 285

Leu Pro Gly Ile His Pro Asp Leu Phe Lys Asp Ile Asn Lys Pro Asp
290 295 300

Ser Val Lys Thr Ala Val Asp Trp Glu Glu Met Gln Leu Glu Ala Ile
305 310 315 320

Met Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Lys His Phe Asp
325 330 335

Thr Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
340 345 350

Lys Ser Asp Lys Ser Glu Ile Phe Leu Pro Leu Gly Asp Ile Glu Val
355 360 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Ala Lys Gly Ser Ile Ile Asn
370 375 380

Gln Ala Leu Ile Ser Ala Lys Asp Ser Tyr Cys Ser Asp Leu Leu Ile
385 390 395 400

Lys Gln Ile Gln Asn Arg Tyr Lys Ile Leu Asn Asp Thr Leu Gly Pro
405 410 415

Ile Ile Ser Gln Gly Asn Asp Phe Asn Thr Thr Met Asn Asn Phe Gly

420 425 430

Glu Ser Leu Gly Ala Ile Ala Asn Glu Glu Asn Ile Ser Phe Ile Ala
435 440 445

Lys Ile Gly Ser Tyr Leu Arg Val Gly Phe Tyr Pro Glu Ala Asn Thr
450 455 460

Thr Ile Thr Leu Ser Gly Pro Thr Ile Tyr Ala Gly Ala Tyr Lys Asp
465 470 475 480

Leu Leu Thr Phe Lys Glu Met Ser Ile Asp Thr Ser Ile Leu Ser Ser
485 490 495

Glu Leu Arg Asn Phe Glu Phe Pro Lys Val Asn Ile Ser Gln Ala Thr
500 505 510

Glu Gln Glu Lys Asn Ser Leu Trp Gln Phe Asn Glu Glu Arg Ala Lys
515 520 525

Ile Gln Phe Glu Glu Tyr Lys Lys Asn Tyr Phe Glu Gly Ala Leu
530 535 540

<210> 585
<211> 543
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 585

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Val Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

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Lys Asp Ile Asn Ser Leu Thr Asp Thr Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Ile Leu Glu Leu Lys Asn Ser Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Ile Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
130 135 140

Ile Glu Ser Ala Ser Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145 150 155 160

Asn Asp Pro Glu Phe Asn His Thr Ala Phe Phe Arg Lys Arg Met Gln
165 170 175

Ile Ile Tyr Asp Lys Gln Gln Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
180 185 190

Lys Glu Glu Asn Pro Asp Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
195 200 205

Leu Ser Asn Glu Tyr Ser Lys Asp Ile Asp Glu Leu Asn Ala Tyr Ile
210 215 220

Glu Glu Ser Leu Asn Lys Val Thr Glu Asn Ser Gly Asn Asp Val Arg
225 230 235 240

Asn Phe Glu Glu Phe Lys Thr Gly Glu Val Phe Asn Leu Tyr Glu Gln
245 250 255

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```
Glu Leu Val Glu Arg Trp Asn Leu Ala Gly Ala Ser Asp Ile Leu Arg
            260                 265                 270

Val Ala Ile Leu Lys Asn Ile Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile His Pro Asp Leu Phe Lys Asp Ile Asn Lys Pro Asp
    290                 295                 300

Ser Val Lys Thr Ala Val Asp Trp Glu Glu Met Gln Leu Glu Ala Ile
305                 310                 315                 320

Met Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Lys His Phe Asp
                325                 330                 335

Thr Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
            340                 345                 350

Lys Ser Asp Lys Ser Glu Ile Phe Leu Pro Leu Gly Asp Ile Glu Val
        355                 360                 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Ala Lys Gly Ser Ile Ile Asn
    370                 375                 380

Gln Ala Leu Ile Ser Ala Lys Asp Ser Tyr Cys Ser Asp Leu Leu Ile
385                 390                 395                 400

Lys Gln Ile Gln Asn Arg Tyr Lys Ile Leu Asn Asp Thr Leu Gly Pro
                405                 410                 415

Ile Ile Ser Gln Gly Asn Asp Phe Asn Thr Thr Met Asn Asn Phe Gly
            420                 425                 430

Glu Ser Leu Gly Ala Ile Ala Asn Glu Glu Asn Ile Ser Phe Ile Ala
        435                 440                 445

Lys Ile Gly Ser Tyr Leu Arg Val Gly Phe Tyr Pro Glu Ala Asn Thr
    450                 455                 460
```

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Thr Ile Thr Leu Ser Gly Pro Thr Ile Tyr Ala Gly Ala Tyr Lys Asp
465 470 475 480

Leu Leu Thr Phe Lys Glu Met Ser Ile Asp Thr Ser Ile Leu Ser Ser
485 490 495

Glu Leu Arg Asn Phe Glu Phe Pro Lys Val Asn Ile Ser Gln Ala Thr
500 505 510

Glu Gln Glu Lys Asn Ser Leu Trp Gln Phe Asn Glu Glu Arg Ala Lys
515 520 525

Ile Gln Phe Glu Glu Tyr Lys Lys Asn Tyr Phe Glu Gly Ala Leu
530 535 540

<210> 586
<211> 543
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 586

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Val Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Thr Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Ile Leu Glu Leu Lys Asn Ser Asn Leu Thr Pro Val Glu Lys Asn

```
                85                  90                  95

Leu His Phe Ile Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Ile Glu Ser Ala Ser Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Glu Phe Asn His Thr Ala Phe Phe Arg Lys Arg Met Gln
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Gln Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Lys Glu Glu Asn Pro Asp Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Asp Ile Asp Glu Leu Asn Ala Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Val Thr Glu Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Thr Gly Glu Val Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Gly Ala Ser Asp Ile Leu Arg
            260                 265                 270

Val Ala Ile Leu Lys Asn Ile Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile His Pro Asp Leu Phe Lys Asp Ile Asn Lys Pro Asp
```

```
    290                 295                 300

Ser Val Lys Thr Ala Val Asp Trp Glu Glu Met Gln Leu Glu Ala Ile
305                 310                 315                 320

Met Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Lys His Phe Asp
                325                 330                 335

Thr Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
            340                 345                 350

Lys Ser Asp Lys Ser Glu Ile Phe Leu Pro Leu Gly Asp Ile Glu Val
        355                 360                 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Ala Lys Gly Ser Ile Ile Asn
    370                 375                 380

Gln Ala Leu Ile Ser Ala Lys Asp Ser Tyr Cys Ser Asp Leu Leu Ile
385                 390                 395                 400

Lys Gln Ile Gln Asn Arg Tyr Lys Ile Leu Asn Asp Thr Leu Gly Pro
                405                 410                 415

Ile Ile Ser Gln Gly Asn Asp Phe Asn Thr Thr Met Asn Asn Phe Gly
            420                 425                 430

Glu Ser Leu Gly Ala Ile Ala Asn Glu Glu Asn Ile Ser Phe Ile Ala
        435                 440                 445

Lys Ile Gly Ser Tyr Leu Arg Val Gly Phe Tyr Pro Glu Ala Asn Thr
    450                 455                 460

Thr Ile Thr Leu Ser Gly Pro Thr Ile Tyr Ala Gly Ala Tyr Lys Asp
465                 470                 475                 480

Leu Leu Thr Phe Lys Glu Met Ser Ile Asp Thr Ser Ile Leu Ser Ser
                485                 490                 495

Glu Leu Arg Asn Phe Glu Phe Pro Lys Val Asn Ile Ser Gln Ala Thr
```

500 505 510

Glu Gln Glu Lys Asn Ser Leu Trp Gln Phe Asn Glu Glu Arg Ala Lys
515 520 525

Ile Gln Phe Glu Glu Tyr Lys Lys Asn Tyr Phe Glu Gly Ala Leu
530 535 540

<210> 587
<211> 542
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<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 587

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

```
Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335
```

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Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
    530                 535                 540
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<210> 588
<211> 542
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<213> Artificial Sequence

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<223> Synthetic amino acid sequence

<400> 588

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Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1               5                   10                  15


Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
            20                  25                  30


Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45


Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60


Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80


Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95


Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110


Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125


Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140


Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160


Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
```

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```
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
```

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370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 589
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 589

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Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1               5                  10                  15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
            20                  25                  30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205
```

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```
Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415
```

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Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 590
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 590

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu

```
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
```

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245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
260 265 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp Met
275 280 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
290 295 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr

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450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 591
<211> 542
<212> PRT
<213> Artificial Sequence

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<223> Synthetic amino acid sequence

<400> 591

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Val Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

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```
Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Val Glu Ser Ala Thr Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Tyr Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Thr Gln
            180                 185                 190

Arg Glu Glu Asn Pro Asp Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Asp Ile Asp Glu Leu Asn Ser Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Val Thr Glu Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Gly Gly Glu Ser Phe Lys Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Val Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285
```

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```
Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Val Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Ala Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495
```

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Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Lys Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 592
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 592

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val

```
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
```

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325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu

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530 535 540

<210> 593
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 593

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
130 135 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145 150 155 160

```
Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365
```

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```
Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
    530                 535                 540


<210>  594
<211>  542
<212>  PRT
<213>  Artificial Sequence

<220>
<223>  Synthetic amino acid sequence
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2013333532

<400> 594

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Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1               5                  10                  15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
            20                  25                  30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
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195 200 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
210 215 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225 230 235 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
260 265 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp Met
275 280 285

Leu Pro Gly Ile Gln Pro Gly Leu Phe Glu Ser Ile Glu Lys Pro Ser
290 295 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala

405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 595
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 595

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

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```
Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240
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```
Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Gly Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445
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Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 596
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 596

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr

```
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp Met
```

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275 280 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
290 295 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp

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485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 597
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 597

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

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```
Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320
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Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

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Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 598
<211> 543
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 598

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Val Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Thr Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Ile
65 70 75 80

Glu Ile Leu Glu Leu Lys Asn Ser Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Ile Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
130 135 140

Ile Glu Ser Ala Ser Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu

```
145                 150                 155                 160

Asn Asp Pro Glu Phe Asn His Thr Ala Phe Phe Arg Lys Arg Met Gln
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Gln Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Lys Glu Glu Asn Pro Asp Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Asp Ile Asp Glu Leu Asn Ala Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Val Thr Glu Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Thr Gly Glu Val Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Gly Ala Ser Asp Ile Leu Arg
            260                 265                 270

Val Ala Ile Leu Lys Asn Ile Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile His Pro Asp Leu Phe Lys Asp Ile Asn Lys Pro Asp
    290                 295                 300

Ser Val Lys Thr Ala Val Asp Trp Glu Glu Met Gln Leu Glu Ala Ile
305                 310                 315                 320

Met Lys His Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Lys His Phe Asp
                325                 330                 335

Thr Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
            340                 345                 350

Lys Ser Asp Lys Ser Glu Ile Phe Leu Pro Leu Gly Asp Ile Glu Val
```

355 360 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Ala Lys Gly Ser Ile Ile Asn
370 375 380

Gln Ala Leu Ile Ser Ala Lys Asp Ser Tyr Cys Ser Asp Leu Leu Ile
385 390 395 400

Lys Gln Ile Gln Asn Arg Tyr Lys Ile Leu Asn Asp Thr Leu Gly Pro
405 410 415

Ile Ile Ser Gln Gly Asn Asp Phe Asn Thr Thr Met Asn Asn Phe Gly
420 425 430

Glu Ser Leu Gly Ala Ile Ala Asn Glu Glu Asn Ile Ser Phe Ile Ala
435 440 445

Lys Ile Gly Ser Tyr Leu Arg Val Gly Phe Tyr Pro Glu Ala Asn Thr
450 455 460

Thr Ile Thr Leu Ser Gly Pro Thr Ile Tyr Ala Gly Ala Tyr Lys Asp
465 470 475 480

Leu Leu Thr Phe Lys Glu Met Ser Ile Asp Thr Ser Ile Leu Ser Ser
485 490 495

Glu Leu Arg Asn Phe Glu Phe Pro Lys Val Asn Ile Ser Gln Ala Thr
500 505 510

Glu Gln Glu Lys Asn Ser Leu Trp Gln Phe Asn Glu Glu Arg Ala Lys
515 520 525

Ile Gln Phe Glu Glu Tyr Lys Lys Asn Tyr Phe Glu Gly Ala Leu
530 535 540

<210> 599
<211> 542
<212> PRT
<213> Artificial Sequence

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<220>
<223> Synthetic amino acid sequence

<400> 599

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
130 135 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145 150 155 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
165 170 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
180 185 190

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```
Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400
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Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ser Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 600
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 600

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu

```
            20                  25                  30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
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225 230 235 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
260 265 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp Met
275 280 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
290 295 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu

435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ser Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 601
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 601

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

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```
Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270
```

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```
Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480
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Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ser Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 602
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 602

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn

```
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
```

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305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Phe Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ser Arg Ala Lys Ala

515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 603
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 603

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
130 135 140

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```
Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350
```

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Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Phe Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ser Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 604
<211> 542
<212> PRT

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<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 604

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Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1               5                  10                  15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
            20                  25                  30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
```

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180 185 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
195 200 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
210 215 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225 230 235 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
260 265 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp Met
275 280 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
290 295 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys

385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 605
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 605

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

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```
Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
            20                  25                  30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220
```

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```
Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Gly Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430
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Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 606
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 606

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys

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50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
130 135 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145 150 155 160

Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
165 170 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
180 185 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
195 200 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
210 215 220

Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val Arg
225 230 235 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu Gln
245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg

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260 265 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp Met
275 280 285

Leu Pro Gly Ile Gln Pro Gly Leu Phe Glu Ser Ile Glu Lys Pro Ser
290 295 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu

465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Thr Phe Asp Asp Ala Arg Ala Lys Val
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 607
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 607

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

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```
Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Gly Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300
```

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```
Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510
```

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Gln Glu Met Ala Ser Leu Trp Thr Phe Asp Asp Ala Arg Ala Lys Val
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 608
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 608

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile

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130 135 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145 150 155 160

Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
165 170 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
180 185 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
195 200 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
210 215 220

Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val Arg
225 230 235 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu Gln
245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
260 265 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp Met
275 280 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
290 295 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser Lys

340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Thr Phe Asp Asp Ala Arg Ala Lys Val
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 609

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<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 609

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Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1               5                  10                  15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
            20                  25                  30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175
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```
Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Gly Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380
```

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Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Thr Phe Asp Asp Ala Arg Ala Lys Val
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 610
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 610

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe

```
1               5                   10                  15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
            20                  25                  30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
```

210 215 220

Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val Arg
225 230 235 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu Gln
245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
260 265 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp Met
275 280 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
290 295 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp

420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Thr Phe Asp Asp Ala Arg Ala Lys Val
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 611
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 611

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

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Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
130 135 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145 150 155 160

Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
165 170 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
180 185 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
195 200 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
210 215 220

Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val Arg
225 230 235 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu Gln
245 250 255

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```
Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460
```

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Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Thr Phe Asp Asp Ala Arg Ala Lys Val
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 612
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 612

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn

```
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
```

290 295 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu

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500 505 510

Gln Glu Met Ala Ser Leu Trp Thr Phe Asp Asp Ala Arg Ala Lys Val
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 613
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 613

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

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Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
130 135 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145 150 155 160

Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
165 170 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
180 185 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
195 200 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
210 215 220

Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val Arg
225 230 235 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu Gln
245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
260 265 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp Met
275 280 285

Leu Pro Gly Ile Gln Pro Gly Leu Phe Glu Ser Ile Glu Lys Pro Ser
290 295 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
325 330 335

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```
Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Glu Met Ala Ser Leu Trp Thr Phe Asp Asp Ala Arg Ala Lys Val
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
    530                 535                 540
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<210> 614
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 614

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Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1               5                   10                  15


Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
            20                  25                  30


Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45


Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60


Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80


Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95


Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110


Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125


Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140


Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160


Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
```

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165 170 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
180 185 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
195 200 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
210 215 220

Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val Arg
225 230 235 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu Gln
245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
260 265 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp Met
275 280 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
290 295 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln

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370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Thr Phe Asp Asp Ala Arg Ala Lys Val
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 615
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 615

17 Jun 2019

2013333532


```
Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1               5                  10                  15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
            20                  25                  30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Ile
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
        195                 200                 205
```

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```
Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Gly Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415
```

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Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Thr Phe Asp Asp Ala Arg Ala Lys Val
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 616
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 616

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Val Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu

```
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Val Glu Ser Ala Thr Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Tyr Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Thr Gln
            180                 185                 190

Arg Glu Glu Asn Pro Asp Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Asp Ile Asp Glu Leu Asn Ser Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Val Thr Glu Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Gly Gly Glu Ser Phe Lys Leu Tyr Glu Gln
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245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Ala Ile Leu Ala
260 265 270

Ile Ser Ala Leu Lys Glu Val Gly Gly Val Ala Leu Ala Val Ala Met
275 280 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
290 295 300

Ser Val Thr Val Asp Phe Trp Glu Met Val Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Ala Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr

450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Lys Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 617
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 617

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

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```
Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Ala Ile Leu Ala
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Ala Leu Ala Val Ala Met
        275                 280                 285
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```
Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495
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Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 618
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 618

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Val Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val

```
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Val Glu Ser Ala Thr Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Tyr Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Thr Gln
            180                 185                 190

Arg Glu Glu Asn Pro Asp Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Asp Ile Asp Glu Leu Asn Ser Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Val Thr Glu Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Gly Gly Glu Ser Phe Lys Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Ala Ile Leu Ala
            260                 265                 270

Ile Ser Ala Leu Lys Glu Val Gly Gly Val Ala Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Val Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
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325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Ala Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Lys Asn Tyr Phe Glu Gly Ser Leu

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530 535 540

<210> 619
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 619

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
130 135 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145 150 155 160

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Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Ala Ile Leu Ala
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Ala Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365
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Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 620
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

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<400> 620

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
130 135 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145 150 155 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
165 170 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
180 185 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr

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195 200 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
210 215 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225 230 235 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Ala Ile Leu Ala
260 265 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Ala Leu Ala Val Ala Met
275 280 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
290 295 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala

405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 621
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 621

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

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```
Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240
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```
Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Ala Ile Leu Ala
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Ala Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445
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Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 622
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 622

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr

65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
130 135 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145 150 155 160

Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
165 170 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
180 185 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
195 200 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
210 215 220

Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val Arg
225 230 235 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu Gln
245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Ala Ile Leu Ala
260 265 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Ala Leu Ala Val Ala Met

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275 280 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
290 295 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp

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485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Thr Phe Asp Asp Ala Arg Ala Lys Val
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 623
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 623

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

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```
Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Ala Ile Leu Ala
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Ala Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320
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Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

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Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 624
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 624

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
130 135 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu

```
145                 150                 155                 160

Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Ala Ile Leu Ala
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Ala Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
```

355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Thr Phe Asp Asp Ala Arg Ala Lys Val
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 625
<211> 542
<212> PRT
<213> Artificial Sequence

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<220>
<223> Synthetic amino acid sequence

<400> 625

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Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1               5                  10                  15

Arg Val Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
            20                  25                  30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Val Glu Ser Ala Thr Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Tyr Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Thr Gln
            180                 185                 190
```

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```
Arg Glu Glu Asn Pro Asp Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Asp Ile Asp Glu Leu Asn Ser Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Val Thr Glu Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Gly Gly Glu Ser Phe Lys Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Ala Ile Leu Ala
            260                 265                 270

Ile Ser Ala Leu Lys Glu Val Gly Gly Val Ala Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Val Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400
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Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Ala Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Lys Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 626
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 626

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu

```
            20                  25                  30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
```

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225 230 235 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Ala Ile Leu Ala
260 265 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Ala Leu Ala Val Ala Met
275 280 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
290 295 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu

435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Phe Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 627
<211> 543
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 627

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Val Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Thr Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

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```
Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Ile
65                  70                  75                  80

Glu Ile Leu Glu Leu Lys Asn Ser Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Ile Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Ile Glu Ser Ala Ser Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Glu Phe Asn His Thr Ala Phe Phe Arg Lys Arg Met Gln
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Gln Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Lys Glu Glu Asn Pro Asp Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Asp Ile Asp Glu Leu Asn Ala Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Val Thr Glu Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Thr Gly Glu Val Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Gly Ala Ser Ala Ile Leu Ala
            260                 265                 270
```

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```
Val Ala Ile Leu Lys Asn Ile Gly Gly Val Ala Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile His Pro Asp Leu Phe Lys Asp Ile Asn Lys Pro Asp
    290                 295                 300

Ser Val Lys Thr Ala Val Asp Trp Glu Glu Met Gln Leu Glu Ala Ile
305                 310                 315                 320

Met Lys His Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Lys His Phe Asp
                325                 330                 335

Thr Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
            340                 345                 350

Lys Ser Asp Lys Ser Glu Ile Phe Leu Pro Leu Gly Asp Ile Glu Val
        355                 360                 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Ala Lys Gly Ser Ile Ile Asn
    370                 375                 380

Gln Ala Leu Ile Ser Ala Lys Asp Ser Tyr Cys Ser Asp Leu Leu Ile
385                 390                 395                 400

Lys Gln Ile Gln Asn Arg Tyr Lys Ile Leu Asn Asp Thr Leu Gly Pro
                405                 410                 415

Ile Ile Ser Gln Gly Asn Asp Phe Asn Thr Thr Met Asn Asn Phe Gly
            420                 425                 430

Glu Ser Leu Gly Ala Ile Ala Asn Glu Glu Asn Ile Ser Phe Ile Ala
        435                 440                 445

Lys Ile Gly Ser Tyr Leu Arg Val Gly Phe Tyr Pro Glu Ala Asn Thr
    450                 455                 460

Thr Ile Thr Leu Ser Gly Pro Thr Ile Tyr Ala Gly Ala Tyr Lys Asp
465                 470                 475                 480
```

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Leu Leu Thr Phe Lys Glu Met Ser Ile Asp Thr Ser Ile Leu Ser Ser
485 490 495

Glu Leu Arg Asn Phe Glu Phe Pro Lys Val Asn Ile Ser Gln Ala Thr
500 505 510

Glu Gln Glu Lys Asn Ser Leu Trp Gln Phe Asn Glu Glu Arg Ala Lys
515 520 525

Ile Gln Phe Glu Glu Tyr Lys Lys Asn Tyr Phe Glu Gly Ala Leu
530 535 540

<210> 628
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 628

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn

```
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Ala Ile Leu Ala
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Ala Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
```

305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala

515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 629
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 629

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
130 135 140

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```
Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Ala Ile Leu Ala
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Ala Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser Lys
            340                 345                 350
```

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```
Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Glu Met Ala Ser Leu Trp Thr Phe Asp Asp Ala Arg Ala Lys Val
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
    530                 535                 540

<210>  630
<211>  542
<212>  PRT
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<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 630

```
Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1               5                  10                  15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
            20                  25                  30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
```

```
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Ala Ile Leu Ala
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Ala Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
```

385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 631
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 631

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

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Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
            20                  25                  30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220
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Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Ala Ile Leu Ala
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Ala Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430
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Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Thr Phe Asp Asp Ala Arg Ala Lys Val
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 632
<211> 543
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 632

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Val Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Thr Tyr Ile Asp Thr Tyr Lys Lys

50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Ile Leu Glu Leu Lys Asn Ser Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Ile Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
130 135 140

Ile Glu Ser Ala Ser Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145 150 155 160

Asn Asp Pro Glu Phe Asn His Thr Ala Phe Phe Arg Lys Arg Met Gln
165 170 175

Ile Ile Tyr Asp Lys Gln Gln Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
180 185 190

Lys Glu Glu Asn Pro Asp Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
195 200 205

Leu Ser Asn Glu Tyr Ser Lys Asp Ile Asp Glu Leu Asn Ala Tyr Ile
210 215 220

Glu Glu Ser Leu Asn Lys Val Thr Glu Asn Ser Gly Asn Asp Val Arg
225 230 235 240

Asn Phe Glu Glu Phe Lys Thr Gly Glu Val Phe Asn Leu Tyr Glu Gln
245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Gly Ala Ser Ala Ile Leu Ala

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260 265 270

Val Ala Ile Leu Lys Asn Ile Gly Gly Val Ala Leu Ala Val Ala Met
275 280 285

Leu Pro Gly Ile His Pro Asp Leu Phe Lys Asp Ile Asn Lys Pro Asp
290 295 300

Ser Val Lys Thr Ala Val Asp Trp Glu Glu Met Gln Leu Glu Ala Ile
305 310 315 320

Met Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Lys His Phe Asp
325 330 335

Thr Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
340 345 350

Lys Ser Asp Lys Ser Glu Ile Phe Leu Pro Leu Gly Asp Ile Glu Val
355 360 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Ala Lys Gly Ser Ile Ile Asn
370 375 380

Gln Ala Leu Ile Ser Ala Lys Asp Ser Tyr Cys Ser Asp Leu Leu Ile
385 390 395 400

Lys Gln Ile Gln Asn Arg Tyr Lys Ile Leu Asn Asp Thr Leu Gly Pro
405 410 415

Ile Ile Ser Gln Gly Asn Asp Phe Asn Thr Thr Met Asn Asn Phe Gly
420 425 430

Glu Ser Leu Gly Ala Ile Ala Asn Glu Glu Asn Ile Ser Phe Ile Ala
435 440 445

Lys Ile Gly Ser Tyr Leu Arg Val Gly Phe Tyr Pro Glu Ala Asn Thr
450 455 460

Thr Ile Thr Leu Ser Gly Pro Thr Ile Tyr Ala Gly Ala Tyr Lys Asp

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465 470 475 480

Leu Leu Thr Phe Lys Glu Met Ser Ile Asp Thr Ser Ile Leu Ser Ser
485 490 495

Glu Leu Arg Asn Phe Glu Phe Pro Lys Val Asn Ile Ser Gln Ala Thr
500 505 510

Glu Gln Glu Lys Asn Ser Leu Trp Gln Phe Asn Glu Glu Arg Ala Lys
515 520 525

Ile Gln Phe Glu Glu Tyr Lys Lys Asn Tyr Phe Glu Gly Ala Leu
530 535 540

<210> 633
<211> 543
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 633

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Val Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Thr Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Ile Leu Glu Leu Lys Asn Ser Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

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Leu His Phe Ile Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Ile Glu Ser Ala Ser Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Glu Phe Asn His Thr Ala Phe Phe Arg Lys Arg Met Gln
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Gln Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Lys Glu Glu Asn Pro Asp Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Asp Ile Asp Glu Leu Asn Ala Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Val Thr Glu Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Thr Gly Glu Val Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Gly Ala Ser Ala Ile Leu Ala
            260                 265                 270

Val Ala Ile Leu Lys Asn Ile Gly Gly Val Ala Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile His Pro Asp Leu Phe Lys Asp Ile Asn Lys Pro Asp
    290                 295                 300
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```
Ser Val Lys Thr Ala Val Asp Trp Glu Glu Met Gln Leu Glu Ala Ile
305                 310                 315                 320

Met Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Lys His Phe Asp
                325                 330                 335

Thr Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
            340                 345                 350

Lys Ser Asp Lys Ser Glu Ile Phe Leu Pro Leu Gly Asp Ile Glu Val
        355                 360                 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Ala Lys Gly Ser Ile Ile Asn
    370                 375                 380

Gln Ala Leu Ile Ser Ala Lys Asp Ser Tyr Cys Ser Asp Leu Leu Ile
385                 390                 395                 400

Lys Gln Ile Gln Asn Arg Tyr Lys Ile Leu Asn Asp Thr Leu Gly Pro
                405                 410                 415

Ile Ile Ser Gln Gly Asn Asp Phe Asn Thr Thr Met Asn Asn Phe Gly
            420                 425                 430

Glu Ser Leu Gly Ala Ile Ala Asn Glu Glu Asn Ile Ser Phe Ile Ala
        435                 440                 445

Lys Ile Gly Ser Tyr Leu Arg Val Gly Phe Tyr Pro Glu Ala Asn Thr
    450                 455                 460

Thr Ile Thr Leu Ser Gly Pro Thr Ile Tyr Ala Gly Ala Tyr Lys Asp
465                 470                 475                 480

Leu Leu Thr Phe Lys Glu Met Ser Ile Asp Thr Ser Ile Leu Ser Ser
                485                 490                 495

Glu Leu Arg Asn Phe Glu Phe Pro Lys Val Asn Ile Ser Gln Ala Thr
            500                 505                 510
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Glu Gln Glu Lys Asn Ser Leu Trp Gln Phe Asn Glu Glu Arg Ala Lys
515 520 525

Ile Gln Phe Glu Glu Tyr Lys Lys Asn Tyr Phe Glu Gly Ala Leu
530 535 540

<210> 634
<211> 543
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 634

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Val Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Thr Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Ile Leu Glu Leu Lys Asn Ser Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Ile Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile

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130 135 140

Ile Glu Ser Ala Ser Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145 150 155 160

Asn Asp Pro Glu Phe Asn His Thr Ala Phe Phe Arg Lys Arg Met Gln
165 170 175

Ile Ile Tyr Asp Lys Gln Gln Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
180 185 190

Lys Glu Glu Asn Pro Asp Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
195 200 205

Leu Ser Asn Glu Tyr Ser Lys Asp Ile Asp Glu Leu Asn Ala Tyr Ile
210 215 220

Glu Glu Ser Leu Asn Lys Val Thr Glu Asn Ser Gly Asn Asp Val Arg
225 230 235 240

Asn Phe Glu Glu Phe Lys Thr Gly Glu Val Phe Asn Leu Tyr Glu Gln
245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Gly Ala Ser Ala Ile Leu Ala
260 265 270

Val Ala Ile Leu Lys Asn Ile Gly Gly Val Ala Leu Ala Val Ala Met
275 280 285

Leu Pro Gly Ile His Pro Asp Leu Phe Lys Asp Ile Asn Lys Pro Asp
290 295 300

Ser Val Lys Thr Ala Val Asp Trp Glu Glu Met Gln Leu Glu Ala Ile
305 310 315 320

Met Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Lys His Phe Asp
325 330 335

Thr Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser

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340 345 350

Lys Ser Asp Lys Ser Glu Ile Phe Leu Pro Leu Gly Asp Ile Glu Val
355 360 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Ala Lys Gly Ser Ile Ile Asn
370 375 380

Gln Ala Leu Ile Ser Ala Lys Asp Ser Tyr Cys Ser Asp Leu Leu Ile
385 390 395 400

Lys Gln Ile Gln Asn Arg Tyr Lys Ile Leu Asn Asp Thr Leu Gly Pro
405 410 415

Ile Ile Ser Gln Gly Asn Asp Phe Asn Thr Thr Met Asn Asn Phe Gly
420 425 430

Glu Ser Leu Gly Ala Ile Ala Asn Glu Glu Asn Ile Ser Phe Ile Ala
435 440 445

Lys Ile Gly Ser Tyr Leu Arg Val Gly Phe Tyr Pro Glu Ala Asn Thr
450 455 460

Thr Ile Thr Leu Ser Gly Pro Thr Ile Tyr Ala Gly Ala Tyr Lys Asp
465 470 475 480

Leu Leu Thr Phe Lys Glu Met Ser Ile Asp Thr Ser Ile Leu Ser Ser
485 490 495

Glu Leu Arg Asn Phe Glu Phe Pro Lys Val Asn Ile Ser Gln Ala Thr
500 505 510

Glu Gln Glu Lys Asn Ser Leu Trp Gln Phe Asn Glu Glu Arg Ala Lys
515 520 525

Ile Gln Phe Glu Glu Tyr Lys Lys Asn Tyr Phe Glu Gly Ala Leu
530 535 540

<210> 635

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<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 635

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Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1               5                  10                  15


Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
            20                  25                  30


Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45


Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60


Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80


Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95


Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110


Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125


Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140


Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160


Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175
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```
Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Ala Ile Leu Ala
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Ala Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380
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Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 636
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 636

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe

```
1               5                   10                  15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
            20                  25                  30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
```

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210 215 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225 230 235 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Ala Ile Leu Ala
260 265 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Ala Leu Ala Val Ala Met
275 280 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
290 295 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp

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420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 637
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 637

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

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Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
130 135 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145 150 155 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
165 170 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
180 185 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
195 200 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
210 215 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225 230 235 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
245 250 255

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```
Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Ala Ile Leu Ala
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Ala Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460
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Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 638
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 638

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn

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```
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Ala Ile Leu Ala
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Ala Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
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    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
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500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 639
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 639

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Val Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

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```
Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Val Glu Ser Ala Thr Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Tyr Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Thr Gln
            180                 185                 190

Arg Glu Glu Asn Pro Asp Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Asp Ile Asp Glu Leu Asn Ser Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Val Thr Glu Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Gly Gly Glu Ser Phe Lys Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Ala Ile Leu Ala
            260                 265                 270

Ile Ser Ala Leu Lys Glu Val Gly Gly Val Ala Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Val Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335
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```
Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Ala Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Lys Asn Tyr Phe Glu Gly Ser Leu
    530                 535                 540
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<210> 640
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 640

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Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1               5                  10                  15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
            20                  25                  30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
```

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                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Ala Ile Leu Ala
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Ala Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
```

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370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 641
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 641

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```
Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1               5                  10                  15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
            20                  25                  30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205
```

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```
Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Ala Ile Leu Ala
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Ala Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415
```

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Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 642
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 642

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu

```
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
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245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Ala Ile Leu Ala
260 265 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Ala Leu Ala Val Ala Met
275 280 285

Leu Pro Gly Ile Gln Pro Gly Leu Phe Glu Ser Ile Glu Lys Pro Ser
290 295 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr

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450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 643
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 643

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

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```
Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Ala Ile Leu Ala
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Ala Leu Ala Val Ala Met
        275                 280                 285
```

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```
Leu Pro Gly Ile Gln Pro Gly Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495
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Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 644
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 644

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val

```
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Ala Ile Leu Ala
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Ala Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
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325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu

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530 535 540

<210> 645
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 645

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
130 135 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145 150 155 160

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```
Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Ala Ile Leu Ala
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Ala Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365
```

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```
Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
    530                 535                 540


<210>  646
<211>  543
<212>  PRT
<213>  Artificial Sequence

<220>
<223>  Synthetic amino acid sequence
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<400> 646

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Val Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Thr Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Ile
65 70 75 80

Glu Ile Leu Glu Leu Lys Asn Ser Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Ile Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
130 135 140

Ile Glu Ser Ala Ser Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145 150 155 160

Asn Asp Pro Glu Phe Asn His Thr Ala Phe Phe Arg Lys Arg Met Gln
165 170 175

Ile Ile Tyr Asp Lys Gln Gln Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
180 185 190

Lys Glu Glu Asn Pro Asp Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr

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195 200 205

Leu Ser Asn Glu Tyr Ser Lys Asp Ile Asp Glu Leu Asn Ala Tyr Ile
210 215 220

Glu Glu Ser Leu Asn Lys Val Thr Glu Asn Ser Gly Asn Asp Val Arg
225 230 235 240

Asn Phe Glu Glu Phe Lys Thr Gly Glu Val Phe Asn Leu Tyr Glu Gln
245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Gly Ala Ser Ala Ile Leu Ala
260 265 270

Val Ala Ile Leu Lys Asn Ile Gly Gly Val Ala Leu Ala Val Ala Met
275 280 285

Leu Pro Gly Ile His Pro Asp Leu Phe Lys Asp Ile Asn Lys Pro Asp
290 295 300

Ser Val Lys Thr Ala Val Asp Trp Glu Glu Met Gln Leu Glu Ala Ile
305 310 315 320

Met Lys His Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Lys His Phe Asp
325 330 335

Thr Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
340 345 350

Lys Ser Asp Lys Ser Glu Ile Phe Leu Pro Leu Gly Asp Ile Glu Val
355 360 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Ala Lys Gly Ser Ile Ile Asn
370 375 380

Gln Ala Leu Ile Ser Ala Lys Asp Ser Tyr Cys Ser Asp Leu Leu Ile
385 390 395 400

Lys Gln Ile Gln Asn Arg Tyr Lys Ile Leu Asn Asp Thr Leu Gly Pro

405 410 415

Ile Ile Ser Gln Gly Asn Asp Phe Asn Thr Thr Met Asn Asn Phe Gly
420 425 430

Glu Ser Leu Gly Ala Ile Ala Asn Glu Glu Asn Ile Ser Phe Ile Ala
435 440 445

Lys Ile Gly Ser Tyr Leu Arg Val Gly Phe Tyr Pro Glu Ala Asn Thr
450 455 460

Thr Ile Thr Leu Ser Gly Pro Thr Ile Tyr Ala Gly Ala Tyr Lys Asp
465 470 475 480

Leu Leu Thr Phe Lys Glu Met Ser Ile Asp Thr Ser Ile Leu Ser Ser
485 490 495

Glu Leu Arg Asn Phe Glu Phe Pro Lys Val Asn Ile Ser Gln Ala Thr
500 505 510

Glu Gln Glu Lys Asn Ser Leu Trp Gln Phe Asn Glu Glu Arg Ala Lys
515 520 525

Ile Gln Phe Glu Glu Tyr Lys Lys Asn Tyr Phe Glu Gly Ala Leu
530 535 540

<210> 647
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 647

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

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```
Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240
```

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```
Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Ala Ile Leu Ala
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Ala Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445
```

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Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ser Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 648
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 648

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr

65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
130 135 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145 150 155 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
165 170 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
180 185 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
195 200 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
210 215 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225 230 235 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Ala Ile Leu Ala
260 265 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Ala Leu Ala Val Ala Met

275 280 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
290 295 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp

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485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ser Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 649
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 649

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

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```
Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Ala Ile Leu Ala
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Ala Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320
```

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```
Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ser Arg Ala Lys Ala
        515                 520                 525
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Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 650
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 650

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
130 135 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu

```
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Ala Ile Leu Ala
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Ala Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
```

355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Phe Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ser Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 651
<211> 542
<212> PRT
<213> Artificial Sequence

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<220>
<223> Synthetic amino acid sequence

<400> 651

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Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1               5                  10                  15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
            20                  25                  30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190
```

```
Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Ala Ile Leu Ala
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Ala Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400
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Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Phe Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ser Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 652
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 652

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu

```
            20                  25                  30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
```

225 230 235 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Ala Ile Leu Ala
260 265 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Ala Leu Ala Val Ala Met
275 280 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
290 295 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu

435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 653
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 653

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

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```
Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Ala Ile Leu Ala
            260                 265                 270
```

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```
Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Ala Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Gly Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480
```

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Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 654
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 654

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn

```
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Ala Ile Leu Ala
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Ala Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Gly Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
```

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305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Thr Phe Asp Asp Ala Arg Ala Lys Val

515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 655
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 655

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
130 135 140

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```
Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Ala Ile Leu Ala
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Ala Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Gly Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser Lys
            340                 345                 350
```

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```
Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Glu Met Ala Ser Leu Trp Thr Phe Asp Asp Ala Arg Ala Lys Val
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
    530                 535                 540

<210>  656
<211>  542
<212>  PRT
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<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 656

```
Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1               5                  10                  15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
            20                  25                  30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
```

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```
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Ala Ile Leu Ala
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Ala Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
```

385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Thr Phe Asp Asp Ala Arg Ala Lys Val
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 657
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 657

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

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```
Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
            20                  25                  30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220
```

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```
Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Ala Ile Leu Ala
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Ala Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Gly Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430
```

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Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Thr Phe Asp Asp Ala Arg Ala Lys Val
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 658
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 658

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys

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```
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Ala Ile Leu Ala
```

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260 265 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Ala Leu Ala Val Ala Met
275 280 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
290 295 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu

465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Thr Phe Asp Asp Ala Arg Ala Lys Val
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 659
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 659

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

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```
Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Ala Ile Leu Ala
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Ala Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300
```

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```
Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510
```

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Gln Glu Met Ala Ser Leu Trp Thr Phe Asp Asp Ala Arg Ala Lys Val
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 660
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 660

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile

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130 135 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145 150 155 160

Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
165 170 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
180 185 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
195 200 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
210 215 220

Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val Arg
225 230 235 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu Gln
245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Ala Ile Leu Ala
260 265 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Ala Leu Ala Val Ala Met
275 280 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
290 295 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser Lys

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340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Thr Phe Asp Asp Ala Arg Ala Lys Val
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 661

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<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 661

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Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1               5                  10                  15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
            20                  25                  30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175
```

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```
Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Ala Ile Leu Ala
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Ala Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Gly Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380
```

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Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Thr Phe Asp Asp Ala Arg Ala Lys Val
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 662
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 662

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe

```
1               5                   10                  15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
            20                  25                  30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
```

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210 215 220

Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val Arg
225 230 235 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu Gln
245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Ala Ile Leu Ala
260 265 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Ala Leu Ala Val Ala Met
275 280 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
290 295 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp

420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Thr Phe Asp Asp Ala Arg Ala Lys Val
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 663
<211> 542
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 663

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

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```
Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Ile
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu Gln
                245                 250                 255
```

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```
Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Ala Ile Leu Ala
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Ala Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Gly Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460
```

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Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Thr Phe Asp Asp Ala Arg Ala Lys Val
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu
530 535 540

<210> 664
<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 664

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu

```
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Pro Arg Pro Ser Ser
```

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290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln

```
            500                 505                 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
    530                 535                 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545                 550                 555                 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
        595                 600                 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
    610                 615                 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625                 630                 635                 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
                645                 650                 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
            660                 665                 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
        675                 680                 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
    690                 695                 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
```

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705 710 715 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser Ile
725 730 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
740 745 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
755 760 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
770 775 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785 790 795 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
805 810 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
820 825 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
835 840 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
850 855 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865 870 875 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
885 890 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
900 905 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys

915 920 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
930 935 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945 950 955 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
965 970 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
980 985 990

Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln Leu
995 1000 1005

Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val Leu
1010 1015 1020

Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu Asp
1025 1030 1035

Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu His
1040 1045 1050

Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val Leu
1055 1060 1065

Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser Ile
1070 1075 1080

Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile Ala
1085 1090 1095

Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile
1100 1105 1110

Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu

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1115 1120 1125

Ser Glu Ser Lys Glu Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys
1130 1135 1140

Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Tyr Ile Ser Ser His Ile Pro Ser Leu Ser Val
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Lys Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asn Gly
1235 1240 1245

Thr Lys Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Thr Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asp Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr

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1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Met Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Asn Leu Ile
1355 1360 1365

Glu Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Gly Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp

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1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asn Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile

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1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Ser Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Ser Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asn Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn

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1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile

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2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

Tyr Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Val Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr His
2165 2170 2175

Asn Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Lys Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Ile Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Thr His Leu Cys Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly

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2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Ser Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Val
2330 2335 2340

Ala Val Thr Gly Trp Gln Thr Ile Asp Gly Glu Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Arg Tyr Tyr Phe Asn Thr Asn Thr Tyr Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn

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2480 2485 2490

Thr Asn Thr Tyr Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asp Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Ala Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Ser Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe

2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

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<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 665

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Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

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Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335
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Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
    530                 535                 540
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Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545                 550                 555                 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
        595                 600                 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
    610                 615                 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625                 630                 635                 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
                645                 650                 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
            660                 665                 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
        675                 680                 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
    690                 695                 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705                 710                 715                 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
                725                 730                 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
            740                 745                 750
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Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
        755                 760                 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
    770                 775                 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785                 790                 795                 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
                805                 810                 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
            820                 825                 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
        835                 840                 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
    850                 855                 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865                 870                 875                 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
                885                 890                 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
            900                 905                 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
        915                 920                 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
    930                 935                 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945                 950                 955                 960
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Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
                965                 970                 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
            980                 985                 990

Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Tyr Asp Ser  Ile Gln Leu
        995                 1000                1005

Val Asn  Leu Ile Ser Asn Ala  Val Asn Asp Thr Ile  Asn Val Leu
    1010                1015                1020

Pro Thr  Ile Thr Glu Gly Ile  Pro Ile Val Ser Thr  Ile Leu Asp
    1025                1030                1035

Gly Ile  Asn Leu Gly Ala Ala  Ile Lys Glu Leu Leu  Asp Glu His
    1040                1045                1050

Asp Pro  Leu Leu Lys Lys Glu  Leu Glu Ala Lys Val  Gly Val Leu
    1055                1060                1065

Ala Ile  Asn Met Ser Leu Ser  Ile Ala Ala Thr Val  Ala Ser Ile
    1070                1075                1080

Val Gly  Ile Gly Ala Glu Val  Thr Ile Phe Leu Leu  Pro Ile Ala
    1085                1090                1095

Gly Ile  Ser Ala Gly Ile Pro  Ser Leu Val Asn Asn  Glu Leu Ile
    1100                1105                1110

Leu His  Asp Lys Ala Thr Ser  Val Val Asn Tyr Phe  Asn His Leu
    1115                1120                1125

Ser Glu  Ser Lys Lys Tyr Gly  Pro Leu Lys Thr Glu  Asp Asp Lys
    1130                1135                1140

Ile Leu  Val Pro Ile Asp Asp  Leu Val Ile Ser Glu  Ile Asp Phe
    1145                1150                1155
```

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Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly
1235 1240 1245

Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

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```
Glu Ile  Ser Ile Glu Asn Gly  Thr Ile Lys Lys Gly  Lys Leu Ile
    1355                1360                1365

Lys Asp  Val Leu Ser Lys Ile  Asp Ile Asn Lys Asn  Lys Leu Ile
    1370                1375                1380

Ile Gly  Asn Gln Thr Ile Asp  Phe Ser Gly Asp Ile  Asp Asn Lys
    1385                1390                1395

Asp Arg  Tyr Ile Phe Leu Thr  Cys Glu Leu Asp Asp  Lys Ile Ser
    1400                1405                1410

Leu Ile  Ile Glu Ile Asn Leu  Val Ala Lys Ser Tyr  Ser Leu Leu
    1415                1420                1425

Leu Ser  Gly Asp Lys Asn Tyr  Leu Ile Ser Asn Leu  Ser Asn Thr
    1430                1435                1440

Ile Glu  Lys Ile Asn Thr Leu  Gly Leu Asp Ser Lys  Asn Ile Ala
    1445                1450                1455

Tyr Asn  Tyr Thr Asp Glu Ser  Asn Asn Lys Tyr Phe  Gly Ala Ile
    1460                1465                1470

Ser Lys  Thr Ser Gln Lys Ser  Ile Ile His Tyr Lys  Lys Asp Ser
    1475                1480                1485

Lys Asn  Ile Leu Glu Phe Tyr  Asn Asp Ser Thr Leu  Glu Phe Asn
    1490                1495                1500

Ser Lys  Asp Phe Ile Ala Glu  Asp Ile Asn Val Phe  Met Lys Asp
    1505                1510                1515

Asp Ile  Asn Thr Ile Thr Gly  Lys Tyr Tyr Val Asp  Asn Asn Thr
    1520                1525                1530

Asp Lys  Ser Ile Asp Phe Ser  Ile Ser Leu Val Ser  Lys Asn Gln
    1535                1540                1545
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Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

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```
Asp Phe  Ile Leu Val Arg Tyr  Leu Glu Glu Ser Asn  Lys Lys Ile
    1745                1750                1755

Leu Gln  Lys Ile Arg Ile Lys  Gly Ile Leu Ser Asn  Thr Gln Ser
    1760                1765                1770

Phe Asn  Lys Met Ser Ile Asp  Phe Lys Asp Ile Lys  Lys Leu Ser
    1775                1780                1785

Leu Gly  Tyr Ile Met Ser Asn  Phe Lys Ser Phe Asn  Ser Glu Asn
    1790                1795                1800

Glu Leu  Asp Arg Asp His Leu  Gly Phe Lys Ile Ile  Asp Asn Lys
    1805                1810                1815

Thr Tyr  Tyr Tyr Asp Glu Asp  Ser Lys Leu Val Lys  Gly Leu Ile
    1820                1825                1830

Asn Ile  Asn Asn Ser Leu Phe  Tyr Phe Asp Pro Ile  Glu Phe Asn
    1835                1840                1845

Leu Val  Thr Gly Trp Gln Thr  Ile Asn Gly Lys Lys  Tyr Tyr Phe
    1850                1855                1860

Asp Ile  Asn Thr Gly Ala Ala  Leu Thr Ser Tyr Lys  Ile Ile Asn
    1865                1870                1875

Gly Lys  His Phe Tyr Phe Asn  Asn Asp Gly Val Met  Gln Leu Gly
    1880                1885                1890

Val Phe  Lys Gly Pro Asp Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    1895                1900                1905

Thr Gln  Asn Asn Asn Ile Glu  Gly Gln Ala Ile Val  Tyr Gln Ser
    1910                1915                1920

Lys Phe  Leu Thr Leu Asn Gly  Lys Lys Tyr Tyr Phe  Asp Asn Asp
    1925                1930                1935
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Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

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```
Asn Thr  Ala Ile Ala Ser Thr  Gly Tyr Thr Ile Ile  Asn Gly Lys
    2135                2140                2145

His Phe  Tyr Phe Asn Thr Asp  Gly Ile Met Gln Ile  Gly Val Phe
    2150                2155                2160

Lys Gly  Pro Asn Gly Phe Glu  Tyr Phe Ala Pro Ala  Asn Thr Asp
    2165                2170                2175

Ala Asn  Asn Ile Glu Gly Gln  Ala Ile Leu Tyr Gln  Asn Glu Phe
    2180                2185                2190

Leu Thr  Leu Asn Gly Lys Lys  Tyr Tyr Phe Gly Ser  Asp Ser Lys
    2195                2200                2205

Ala Val  Thr Gly Trp Arg Ile  Ile Asn Asn Lys Lys  Tyr Tyr Phe
    2210                2215                2220

Asn Pro  Asn Asn Ala Ile Ala  Ala Ile His Leu Cys  Thr Ile Asn
    2225                2230                2235

Asn Asp  Lys Tyr Tyr Phe Ser  Tyr Asp Gly Ile Leu  Gln Asn Gly
    2240                2245                2250

Tyr Ile  Thr Ile Glu Arg Asn  Asn Phe Tyr Phe Asp  Ala Asn Asn
    2255                2260                2265

Glu Ser  Lys Met Val Thr Gly  Val Phe Lys Gly Pro  Asn Gly Phe
    2270                2275                2280

Glu Tyr  Phe Ala Pro Ala Asn  Thr His Asn Asn Asn  Ile Glu Gly
    2285                2290                2295

Gln Ala  Ile Val Tyr Gln Asn  Lys Phe Leu Thr Leu  Asn Gly Lys
    2300                2305                2310

Lys Tyr  Tyr Phe Asp Asn Asp  Ser Lys Ala Val Thr  Gly Trp Gln
    2315                2320                2325
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```
Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn Leu Asn  Thr Ala Glu
    2330                2335                2340

Ala Ala  Thr Gly Trp Gln Thr  Ile Asp Gly Lys Lys  Tyr Tyr Phe
    2345                2350                2355

Asn Leu  Asn Thr Ala Glu Ala  Ala Thr Gly Trp Gln  Thr Ile Asp
    2360                2365                2370

Gly Lys  Lys Tyr Tyr Phe Asn  Thr Asn Thr Phe Ile  Ala Ser Thr
    2375                2380                2385

Gly Tyr  Thr Ser Ile Asn Gly  Lys His Phe Tyr Phe  Asn Thr Asp
    2390                2395                2400

Gly Ile  Met Gln Ile Gly Val  Phe Lys Gly Pro Asn  Gly Phe Glu
    2405                2410                2415

Tyr Phe  Ala Pro Ala Asn Thr  His Asn Asn Asn Ile  Glu Gly Gln
    2420                2425                2430

Ala Ile  Leu Tyr Gln Asn Lys  Phe Leu Thr Leu Asn  Gly Lys Lys
    2435                2440                2445

Tyr Tyr  Phe Gly Ser Asp Ser  Lys Ala Val Thr Gly  Leu Arg Thr
    2450                2455                2460

Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr Asn Thr  Ala Val Ala
    2465                2470                2475

Val Thr  Gly Trp Gln Thr Ile  Asn Gly Lys Lys Tyr  Tyr Phe Asn
    2480                2485                2490

Thr Asn  Thr Ser Ile Ala Ser  Thr Gly Tyr Thr Ile  Ile Ser Gly
    2495                2500                2505

Lys His  Phe Tyr Phe Asn Thr  Asp Gly Ile Met Gln  Ile Gly Val
    2510                2515                2520
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```
Phe Lys  Gly Pro Asp Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr
    2525                2530                2535

Asp Ala  Asn Asn Ile Glu Gly  Gln Ala Ile Arg Tyr  Gln Asn Arg
    2540                2545                2550

Phe Leu  Tyr Leu His Asp Asn  Ile Tyr Tyr Phe Gly  Asn Asn Ser
    2555                2560                2565

Lys Ala  Ala Thr Gly Trp Val  Thr Ile Asp Gly Asn  Arg Tyr Tyr
    2570                2575                2580

Phe Glu  Pro Asn Thr Ala Met  Gly Ala Asn Gly Tyr  Lys Thr Ile
    2585                2590                2595

Asp Asn  Lys Asn Phe Tyr Phe  Arg Asn Gly Leu Pro  Gln Ile Gly
    2600                2605                2610

Val Phe  Lys Gly Ser Asn Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2615                2620                2625

Thr Asp  Ala Asn Asn Ile Glu  Gly Gln Ala Ile Arg  Tyr Gln Asn
    2630                2635                2640

Arg Phe  Leu His Leu Leu Gly  Lys Ile Tyr Tyr Phe  Gly Asn Asn
    2645                2650                2655

Ser Lys  Ala Val Thr Gly Trp  Gln Thr Ile Asn Gly  Lys Val Tyr
    2660                2665                2670

Tyr Phe  Met Pro Asp Thr Ala  Met Ala Ala Ala Gly  Gly Leu Phe
    2675                2680                2685

Glu Ile  Asp Gly Val Ile Tyr  Phe Phe Gly Val Asp  Gly Val Lys
    2690                2695                2700

Ala Pro  Gly Ile Tyr Gly
    2705
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<210> 666
<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 666

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
130 135 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145 150 155 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe

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165 170 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
180 185 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
195 200 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
210 215 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225 230 235 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Ala Val Ala Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Pro Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala

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370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
530 535 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545 550 555 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
565 570 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr

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580 585 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
595 600 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
610 615 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625 630 635 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
645 650 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
660 665 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
675 680 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
690 695 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705 710 715 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser Ile
725 730 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
740 745 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
755 760 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
770 775 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser

785 790 795 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
805 810 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
820 825 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
835 840 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
850 855 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865 870 875 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
885 890 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
900 905 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
915 920 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
930 935 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945 950 955 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
965 970 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
980 985 990

Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln Leu

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995 1000 1005

Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val Leu
1010 1015 1020

Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu Asp
1025 1030 1035

Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu His
1040 1045 1050

Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val Leu
1055 1060 1065

Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser Ile
1070 1075 1080

Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile Ala
1085 1090 1095

Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile
1100 1105 1110

Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu
1115 1120 1125

Ser Glu Ser Lys Glu Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys
1130 1135 1140

Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Tyr Ile Ser Ser His Ile Pro Ser Leu Ser Val

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1190 1195 1200

Tyr Ser Ala Ile Gly Ile Lys Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asn Gly
1235 1240 1245

Thr Lys Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Thr Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asp Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Met Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Asn Leu Ile
1355 1360 1365

Glu Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys

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1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Gly Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asn Asn Ile Ser Phe Trp Lys Leu

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1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser

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1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Ser Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Ser Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asn Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile

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1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

Tyr Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Val Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr His

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2165 2170 2175

Asn Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Lys Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Ile Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Thr His Leu Cys Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Ser Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Val
2330 2335 2340

Ala Val Thr Gly Trp Gln Thr Ile Asp Gly Glu Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp

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2360 2365 2370

Gly Lys Arg Tyr Tyr Phe Asn Thr Asn Thr Tyr Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Tyr Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asp Ser

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2555 2560 2565

Lys Ala Ala Thr Gly Trp Ala Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Ser Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

<210> 667
<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 667

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Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1               5                  10                  15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
            20                  25                  30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205
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```
Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415
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```
Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
    530                 535                 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545                 550                 555                 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
        595                 600                 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
    610                 615                 620
```

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```
Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625                 630                 635                 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
                645                 650                 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
            660                 665                 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
        675                 680                 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
    690                 695                 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705                 710                 715                 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
                725                 730                 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
            740                 745                 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
        755                 760                 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
    770                 775                 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785                 790                 795                 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
                805                 810                 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
            820                 825                 830
```

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```
Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
        835                 840                 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
    850                 855                 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865                 870                 875                 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
                885                 890                 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
            900                 905                 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
        915                 920                 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
    930                 935                 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945                 950                 955                 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
                965                 970                 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
            980                 985                 990

Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Tyr Asp Ser  Ile Gln Leu
        995                 1000                1005

Val Asn  Leu Ile Ser Asn Ala  Val Asn Asp Thr Ile  Asn Val Leu
    1010                1015                1020

Pro Thr  Ile Thr Glu Gly Ile  Pro Ile Val Ser Thr  Ile Leu Asp
    1025                1030                1035
```

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Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu His
1040 1045 1050

Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val Leu
1055 1060 1065

Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser Ile
1070 1075 1080

Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile Ala
1085 1090 1095

Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile
1100 1105 1110

Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu
1115 1120 1125

Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys
1130 1135 1140

Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

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Glu Thr  Gly Ala Val Pro Gly  Leu Arg Ser Leu Glu  Asn Asp Gly
    1235                1240                1245

Thr Arg  Leu Leu Asp Ser Ile  Arg Asp Leu Tyr Pro  Gly Lys Phe
    1250                1255                1260

Tyr Trp  Arg Phe Tyr Ala Phe  Phe Asp Tyr Ala Ile  Thr Thr Leu
    1265                1270                1275

Lys Pro  Val Tyr Glu Asp Thr  Asn Ile Lys Ile Lys  Leu Asp Lys
    1280                1285                1290

Asp Thr  Arg Asn Phe Ile Met  Pro Thr Ile Thr Thr  Asn Glu Ile
    1295                1300                1305

Arg Asn  Lys Leu Ser Tyr Ser  Phe Asp Gly Ala Gly  Gly Thr Tyr
    1310                1315                1320

Ser Leu  Leu Leu Ser Ser Tyr  Pro Ile Ser Thr Asn  Ile Asn Leu
    1325                1330                1335

Ser Lys  Asp Asp Leu Trp Ile  Phe Asn Ile Asp Asn  Glu Val Arg
    1340                1345                1350

Glu Ile  Ser Ile Glu Asn Gly  Thr Ile Lys Lys Gly  Lys Leu Ile
    1355                1360                1365

Lys Asp  Val Leu Ser Lys Ile  Asp Ile Asn Lys Asn  Lys Leu Ile
    1370                1375                1380

Ile Gly  Asn Gln Thr Ile Asp  Phe Ser Gly Asp Ile  Asp Asn Lys
    1385                1390                1395

Asp Arg  Tyr Ile Phe Leu Thr  Cys Glu Leu Asp Asp  Lys Ile Ser
    1400                1405                1410

Leu Ile  Ile Glu Ile Asn Leu  Val Ala Lys Ser Tyr  Ser Leu Leu
    1415                1420                1425
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Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

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Asn Asn  Lys Asn Ile Asp Ile  Tyr Phe Gly Glu Trp  Lys Thr Ser
    1625                1630                1635

Ser Ser  Lys Ser Thr Ile Phe  Ser Gly Asn Gly Arg  Asn Val Val
    1640                1645                1650

Val Glu  Pro Ile Tyr Asn Pro  Asp Thr Gly Glu Asp  Ile Ser Thr
    1655                1660                1665

Ser Leu  Asp Phe Ser Tyr Glu  Pro Leu Tyr Gly Ile  Asp Arg Tyr
    1670                1675                1680

Ile Asn  Lys Val Leu Ile Ala  Pro Asp Leu Tyr Thr  Ser Leu Ile
    1685                1690                1695

Asn Ile  Asn Thr Asn Tyr Tyr  Ser Asn Glu Tyr Tyr  Pro Glu Ile
    1700                1705                1710

Ile Val  Leu Asn Pro Asn Thr  Phe His Lys Lys Val  Asn Ile Asn
    1715                1720                1725

Leu Asp  Ser Ser Ser Phe Glu  Tyr Lys Trp Ser Thr  Glu Gly Ser
    1730                1735                1740

Asp Phe  Ile Leu Val Arg Tyr  Leu Glu Glu Ser Asn  Lys Lys Ile
    1745                1750                1755

Leu Gln  Lys Ile Arg Ile Lys  Gly Ile Leu Ser Asn  Thr Gln Ser
    1760                1765                1770

Phe Asn  Lys Met Ser Ile Asp  Phe Lys Asp Ile Lys  Lys Leu Ser
    1775                1780                1785

Leu Gly  Tyr Ile Met Ser Asn  Phe Lys Ser Phe Asn  Ser Glu Asn
    1790                1795                1800

Glu Leu  Asp Arg Asp His Leu  Gly Phe Lys Ile Ile  Asp Asn Lys
    1805                1810                1815
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Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

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Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

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Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
2330 2335 2340

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

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Gly Ile  Met Gln Ile Gly Val  Phe Lys Gly Pro Asn  Gly Phe Glu
    2405                2410                2415

Tyr Phe  Ala Pro Ala Asn Thr  His Asn Asn Asn Ile  Glu Gly Gln
    2420                2425                2430

Ala Ile  Leu Tyr Gln Asn Lys  Phe Leu Thr Leu Asn  Gly Lys Lys
    2435                2440                2445

Tyr Tyr  Phe Gly Ser Asp Ser  Lys Ala Val Thr Gly  Leu Arg Thr
    2450                2455                2460

Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr Asn Thr  Ala Val Ala
    2465                2470                2475

Val Thr  Gly Trp Gln Thr Ile  Asn Gly Lys Lys Tyr  Tyr Phe Asn
    2480                2485                2490

Thr Asn  Thr Ser Ile Ala Ser  Thr Gly Tyr Thr Ile  Ile Ser Gly
    2495                2500                2505

Lys His  Phe Tyr Phe Asn Thr  Asp Gly Ile Met Gln  Ile Gly Val
    2510                2515                2520

Phe Lys  Gly Pro Asp Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr
    2525                2530                2535

Asp Ala  Asn Asn Ile Glu Gly  Gln Ala Ile Arg Tyr  Gln Asn Arg
    2540                2545                2550

Phe Leu  Tyr Leu His Asp Asn  Ile Tyr Tyr Phe Gly  Asn Asn Ser
    2555                2560                2565

Lys Ala  Ala Thr Gly Trp Val  Thr Ile Asp Gly Asn  Arg Tyr Tyr
    2570                2575                2580

Phe Glu  Pro Asn Thr Ala Met  Gly Ala Asn Gly Tyr  Lys Thr Ile
    2585                2590                2595
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Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

<210> 668
<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 668

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys

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        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
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245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Ala Val Ala Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile

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    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
    530                 535                 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545                 550                 555                 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
        595                 600                 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
    610                 615                 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625                 630                 635                 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
                645                 650                 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
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660 665 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
675 680 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
690 695 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705 710 715 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
725 730 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
740 745 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
755 760 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
770 775 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785 790 795 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
805 810 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
820 825 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
835 840 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
850 855 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp

865 870 875 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
885 890 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
900 905 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
915 920 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
930 935 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945 950 955 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
965 970 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
980 985 990

Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln Leu
995 1000 1005

Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val Leu
1010 1015 1020

Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu Asp
1025 1030 1035

Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu His
1040 1045 1050

Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val Leu
1055 1060 1065

Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser Ile

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1070 1075 1080

Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile Ala
1085 1090 1095

Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile
1100 1105 1110

Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu
1115 1120 1125

Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys
1130 1135 1140

Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly
1235 1240 1245

Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu

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1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile
1355 1360 1365

Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile

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1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr

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1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe

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1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys

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2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly

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2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
2330 2335 2340

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys

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2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn

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2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

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<211> 2709
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<213> Artificial Sequence

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Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

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```
Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Ala Val Ala Met Leu
        275                 280                 285
```

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```
Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495
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```
Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
    530                 535                 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545                 550                 555                 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
        595                 600                 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
    610                 615                 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625                 630                 635                 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
                645                 650                 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
            660                 665                 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
        675                 680                 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
    690                 695                 700
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```
Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705                 710                 715                 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
                725                 730                 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
            740                 745                 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
        755                 760                 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
    770                 775                 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785                 790                 795                 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
                805                 810                 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
            820                 825                 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
        835                 840                 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
    850                 855                 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865                 870                 875                 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
                885                 890                 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
            900                 905                 910
```

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```
Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
        915                 920                 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
    930                 935                 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945                 950                 955                 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
                965                 970                 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
            980                 985                 990

Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Tyr Asp Ser  Ile Gln Leu
        995                 1000                1005

Val Asn  Leu Ile Ser Asn Ala  Val Asn Asp Thr Ile  Asn Val Leu
    1010                1015                1020

Pro Thr  Ile Thr Glu Gly Ile  Pro Ile Val Ser Thr  Ile Leu Asp
    1025                1030                1035

Gly Ile  Asn Leu Gly Ala Ala  Ile Lys Glu Leu Leu  Asp Glu His
    1040                1045                1050

Asp Pro  Leu Leu Lys Lys Glu  Leu Glu Ala Lys Val  Gly Val Leu
    1055                1060                1065

Ala Ile  Asn Met Ser Leu Ser  Ile Ala Ala Thr Val  Ala Ser Ile
    1070                1075                1080

Val Gly  Ile Gly Ala Glu Val  Thr Ile Phe Leu Leu  Pro Ile Ala
    1085                1090                1095

Gly Ile  Ser Ala Gly Ile Pro  Ser Leu Val Asn Asn  Glu Leu Ile
    1100                1105                1110
```

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Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu
1115 1120 1125

Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys
1130 1135 1140

Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly
1235 1240 1245

Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

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```
Arg Asn  Lys Leu Ser Tyr Ser  Phe Asp Gly Ala Gly  Gly Thr Tyr
    1310                 1315                 1320

Ser Leu  Leu Leu Ser Ser Tyr  Pro Ile Ser Thr Asn  Ile Asn Leu
    1325                 1330                 1335

Ser Lys  Asp Asp Leu Trp Ile  Phe Asn Ile Asp Asn  Glu Val Arg
    1340                 1345                 1350

Glu Ile  Ser Ile Glu Asn Gly  Thr Ile Lys Lys Gly  Lys Leu Ile
    1355                 1360                 1365

Lys Asp  Val Leu Ser Lys Ile  Asp Ile Asn Lys Asn  Lys Leu Ile
    1370                 1375                 1380

Ile Gly  Asn Gln Thr Ile Asp  Phe Ser Gly Asp Ile  Asp Asn Lys
    1385                 1390                 1395

Asp Arg  Tyr Ile Phe Leu Thr  Cys Glu Leu Asp Asp  Lys Ile Ser
    1400                 1405                 1410

Leu Ile  Ile Glu Ile Asn Leu  Val Ala Lys Ser Tyr  Ser Leu Leu
    1415                 1420                 1425

Leu Ser  Gly Asp Lys Asn Tyr  Leu Ile Ser Asn Leu  Ser Asn Thr
    1430                 1435                 1440

Ile Glu  Lys Ile Asn Thr Leu  Gly Leu Asp Ser Lys  Asn Ile Ala
    1445                 1450                 1455

Tyr Asn  Tyr Thr Asp Glu Ser  Asn Asn Lys Tyr Phe  Gly Ala Ile
    1460                 1465                 1470

Ser Lys  Thr Ser Gln Lys Ser  Ile Ile His Tyr Lys  Lys Asp Ser
    1475                 1480                 1485

Lys Asn  Ile Leu Glu Phe Tyr  Asn Asp Ser Thr Leu  Glu Phe Asn
    1490                 1495                 1500
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```
Ser Lys  Asp Phe Ile Ala Glu  Asp Ile Asn Val Phe  Met Lys Asp
    1505                1510                1515

Asp Val  Asn Thr Ile Thr Gly  Lys Tyr Tyr Val Asp  Asn Asn Thr
    1520                1525                1530

Asp Lys  Ser Ile Asp Phe Ser  Ile Ser Leu Val Ser  Lys Asn Gln
    1535                1540                1545

Val Lys  Val Asn Gly Leu Tyr  Leu Asn Glu Ser Val  Tyr Ser Ser
    1550                1555                1560

Tyr Leu  Asp Phe Val Lys Asn  Ser Asp Gly His His  Asn Thr Ser
    1565                1570                1575

Asn Phe  Met Asn Leu Phe Leu  Asp Asn Ile Ser Phe  Trp Lys Leu
    1580                1585                1590

Phe Gly  Phe Glu Asn Ile Asn  Phe Val Ile Asp Lys  Tyr Phe Thr
    1595                1600                1605

Leu Val  Gly Lys Thr Asn Leu  Gly Tyr Val Glu Phe  Ile Cys Asp
    1610                1615                1620

Asn Asn  Lys Asn Ile Asp Ile  Tyr Phe Gly Glu Trp  Lys Thr Ser
    1625                1630                1635

Ser Ser  Lys Ser Thr Ile Phe  Ser Gly Asn Gly Arg  Asn Val Val
    1640                1645                1650

Val Glu  Pro Ile Tyr Asn Pro  Asp Thr Gly Glu Asp  Ile Ser Thr
    1655                1660                1665

Ser Leu  Asp Phe Ser Tyr Glu  Pro Leu Tyr Gly Ile  Asp Arg Tyr
    1670                1675                1680

Ile Asn  Lys Val Leu Ile Ala  Pro Asp Leu Tyr Thr  Ser Leu Ile
    1685                1690                1695
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Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly
1880 1885 1890

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```
Val Phe  Lys Gly Pro Asp Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    1895                1900                1905

Thr Gln  Asn Asn Asn Ile Glu  Gly Gln Ala Ile Val  Tyr Gln Ser
    1910                1915                1920

Lys Phe  Leu Thr Leu Asn Gly  Lys Lys Tyr Tyr Phe  Asp Asn Asn
    1925                1930                1935

Ser Lys  Ala Val Thr Gly Trp  Arg Ile Ile Asn Asn  Glu Lys Tyr
    1940                1945                1950

Tyr Phe  Asn Pro Asn Asn Ala  Ile Ala Ala Val Gly  Leu Gln Val
    1955                1960                1965

Ile Asp  Asn Asn Lys Tyr Tyr  Phe Asn Pro Asp Thr  Ala Ile Ile
    1970                1975                1980

Ser Lys  Gly Trp Gln Thr Val  Asn Gly Ser Arg Tyr  Tyr Phe Asp
    1985                1990                1995

Thr Asp  Thr Ala Ile Ala Phe  Asn Gly Tyr Lys Thr  Ile Asp Gly
    2000                2005                2010

Lys His  Phe Tyr Phe Asp Ser  Asp Cys Val Val Lys  Ile Gly Val
    2015                2020                2025

Phe Ser  Thr Ser Asn Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr
    2030                2035                2040

Tyr Asn  Asn Asn Ile Glu Gly  Gln Ala Ile Val Tyr  Gln Ser Lys
    2045                2050                2055

Phe Leu  Thr Leu Asn Gly Lys  Lys Tyr Tyr Phe Asp  Asn Asn Ser
    2060                2065                2070

Lys Ala  Val Thr Gly Trp Gln  Thr Ile Asp Ser Lys  Lys Tyr Tyr
    2075                2080                2085
```

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```
Phe Asn  Thr Asn Thr Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile
    2090                2095                2100

Asp Gly  Lys Lys Tyr Tyr Phe  Asn Thr Asn Thr Ala  Glu Ala Ala
    2105                2110                2115

Thr Gly  Trp Gln Thr Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr
    2120                2125                2130

Asn Thr  Ala Ile Ala Ser Thr  Gly Tyr Thr Ile Ile  Asn Gly Lys
    2135                2140                2145

His Phe  Tyr Phe Asn Thr Asp  Gly Ile Met Gln Ile  Gly Val Phe
    2150                2155                2160

Lys Gly  Pro Asn Gly Phe Glu  Tyr Phe Ala Pro Ala  Asn Thr Asp
    2165                2170                2175

Ala Asn  Asn Ile Glu Gly Gln  Ala Ile Leu Tyr Gln  Asn Glu Phe
    2180                2185                2190

Leu Thr  Leu Asn Gly Lys Lys  Tyr Tyr Phe Gly Ser  Asp Ser Lys
    2195                2200                2205

Ala Val  Thr Gly Trp Arg Ile  Ile Asn Asn Lys Lys  Tyr Tyr Phe
    2210                2215                2220

Asn Pro  Asn Asn Ala Ile Ala  Ala Ile His Leu Cys  Thr Ile Asn
    2225                2230                2235

Asn Asp  Lys Tyr Tyr Phe Ser  Tyr Asp Gly Ile Leu  Gln Asn Gly
    2240                2245                2250

Tyr Ile  Thr Ile Glu Arg Asn  Asn Phe Tyr Phe Asp  Ala Asn Asn
    2255                2260                2265

Glu Ser  Lys Met Val Thr Gly  Val Phe Lys Gly Pro  Asn Gly Phe
    2270                2275                2280
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Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
2330 2335 2340

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

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Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

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Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

<210> 670
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Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp

```
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Val Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
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325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp

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530 535 540

Asn Glu Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545 550 555 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
565 570 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
580 585 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
595 600 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
610 615 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625 630 635 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
645 650 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
660 665 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
675 680 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
690 695 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705 710 715 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser Ile
725 730 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg

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740 745 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
755 760 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
770 775 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785 790 795 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Thr Ser Val Ser Pro
805 810 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
820 825 830

Val Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
835 840 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
850 855 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865 870 875 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
885 890 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
900 905 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
915 920 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
930 935 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu

945 950 955 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
965 970 975

Asp Leu Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
980 985 990

Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln Leu
995 1000 1005

Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val Leu
1010 1015 1020

Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu Asp
1025 1030 1035

Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu His
1040 1045 1050

Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val Leu
1055 1060 1065

Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser Ile
1070 1075 1080

Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile Ala
1085 1090 1095

Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile
1100 1105 1110

Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu
1115 1120 1125

Ser Glu Ser Lys Glu Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys
1130 1135 1140

Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe

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1145 1150 1155

Asn Asn Asn Ala Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Lys Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asn Gly
1235 1240 1245

Thr Lys Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg

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1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile
1355 1360 1365

Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Gly Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln

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1535 1540 1545

Ala Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ala Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Val Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser

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1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Val Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Ala Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Ser Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asn Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Arg Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp

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1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Val Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr

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2120 2125 2130

Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Lys Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Ala Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Thr His Leu Tyr Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln

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2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Val
2330 2335 2340

Ala Val Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Thr Asn Thr Ala Glu Thr Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ser Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Ala Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala
2465 2470 2475

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Asp
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val

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2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Arg Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Ile Gly Ala Asn Gly Tyr Lys Ile Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Asn Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Asn Met Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly

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2705

<210> 671
<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 671

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Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1               5                  10                  15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
            20                  25                  30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160
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Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365
```

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```
Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
    530                 535                 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545                 550                 555                 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575
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```
Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
        595                 600                 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
    610                 615                 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625                 630                 635                 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
                645                 650                 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
            660                 665                 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
        675                 680                 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
    690                 695                 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705                 710                 715                 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
                725                 730                 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
            740                 745                 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
        755                 760                 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
    770                 775                 780
```

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```
Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785                 790                 795                 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
                805                 810                 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
            820                 825                 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
        835                 840                 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
    850                 855                 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865                 870                 875                 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
                885                 890                 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
            900                 905                 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
        915                 920                 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
    930                 935                 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945                 950                 955                 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
                965                 970                 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
            980                 985                 990
```

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Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln Leu
995 1000 1005

Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val Leu
1010 1015 1020

Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu Asp
1025 1030 1035

Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu His
1040 1045 1050

Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val Leu
1055 1060 1065

Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser Ile
1070 1075 1080

Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile Ala
1085 1090 1095

Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile
1100 1105 1110

Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu
1115 1120 1125

Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys
1130 1135 1140

Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

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Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly
1235 1240 1245

Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile
1355 1360 1365

Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

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```
Ile Gly  Asn Gln Thr Ile Asp  Phe Ser Gly Asp Ile  Asp Asn Lys
    1385                1390                1395

Asp Arg  Tyr Ile Phe Leu Thr  Cys Glu Leu Asp Asp  Lys Ile Ser
    1400                1405                1410

Leu Ile  Ile Glu Ile Asn Leu  Val Ala Lys Ser Tyr  Ser Leu Leu
    1415                1420                1425

Leu Ser  Gly Asp Lys Asn Tyr  Leu Ile Ser Asn Leu  Ser Asn Thr
    1430                1435                1440

Ile Glu  Lys Ile Asn Thr Leu  Gly Leu Asp Ser Lys  Asn Ile Ala
    1445                1450                1455

Tyr Asn  Tyr Thr Asp Glu Ser  Asn Asn Lys Tyr Phe  Gly Ala Ile
    1460                1465                1470

Ser Lys  Thr Ser Gln Lys Ser  Ile Ile His Tyr Lys  Lys Asp Ser
    1475                1480                1485

Lys Asn  Ile Leu Glu Phe Tyr  Asn Asp Ser Thr Leu  Glu Phe Asn
    1490                1495                1500

Ser Lys  Asp Phe Ile Ala Glu  Asp Ile Asn Val Phe  Met Lys Asp
    1505                1510                1515

Asp Val  Asn Thr Ile Thr Gly  Lys Tyr Tyr Val Asp  Asn Asn Thr
    1520                1525                1530

Asp Lys  Ser Ile Asp Phe Ser  Ile Ser Leu Val Ser  Lys Asn Gln
    1535                1540                1545

Val Lys  Val Asn Gly Leu Tyr  Leu Asn Glu Ser Val  Tyr Ser Ser
    1550                1555                1560

Tyr Leu  Asp Phe Val Lys Asn  Ser Asp Gly His His  Asn Thr Ser
    1565                1570                1575
```

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```
Asn Phe  Met Asn Leu Phe Leu  Asp Asn Ile Ser Phe  Trp Lys Leu
    1580                1585                1590

Phe Gly  Phe Glu Asn Ile Asn  Phe Val Ile Asp Lys  Tyr Phe Thr
    1595                1600                1605

Leu Val  Gly Lys Thr Asn Leu  Gly Tyr Val Glu Phe  Ile Cys Asp
    1610                1615                1620

Asn Asn  Lys Asn Ile Asp Ile  Tyr Phe Gly Glu Trp  Lys Thr Ser
    1625                1630                1635

Ser Ser  Lys Ser Thr Ile Phe  Ser Gly Asn Gly Arg  Asn Val Val
    1640                1645                1650

Val Glu  Pro Ile Tyr Asn Pro  Asp Thr Gly Glu Asp  Ile Ser Thr
    1655                1660                1665

Ser Leu  Asp Phe Ser Tyr Glu  Pro Leu Tyr Gly Ile  Asp Arg Tyr
    1670                1675                1680

Ile Asn  Lys Val Leu Ile Ala  Pro Asp Leu Tyr Thr  Ser Leu Ile
    1685                1690                1695

Asn Ile  Asn Thr Asn Tyr Tyr  Ser Asn Glu Tyr Tyr  Pro Glu Ile
    1700                1705                1710

Ile Val  Leu Asn Pro Asn Thr  Phe His Lys Lys Val  Asn Ile Asn
    1715                1720                1725

Leu Asp  Ser Ser Ser Phe Glu  Tyr Lys Trp Ser Thr  Glu Gly Ser
    1730                1735                1740

Asp Phe  Ile Leu Val Arg Tyr  Leu Glu Glu Ser Asn  Lys Lys Ile
    1745                1750                1755

Leu Gln  Lys Ile Arg Ile Lys  Gly Ile Leu Ser Asn  Thr Gln Ser
    1760                1765                1770
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Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

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Ile Asp  Asn Asn Lys Tyr Tyr  Phe Asn Pro Asp Thr  Ala Ile Ile
    1970                1975                1980

Ser Lys  Gly Trp Gln Thr Val  Asn Gly Ser Arg Tyr  Tyr Phe Asp
    1985                1990                1995

Thr Asp  Thr Ala Ile Ala Phe  Asn Gly Tyr Lys Thr  Ile Asp Gly
    2000                2005                2010

Lys His  Phe Tyr Phe Asp Ser  Asp Cys Val Val Lys  Ile Gly Val
    2015                2020                2025

Phe Ser  Thr Ser Asn Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr
    2030                2035                2040

Tyr Asn  Asn Asn Ile Glu Gly  Gln Ala Ile Val Tyr  Gln Ser Lys
    2045                2050                2055

Phe Leu  Thr Leu Asn Gly Lys  Lys Tyr Tyr Phe Asp  Asn Asn Ser
    2060                2065                2070

Lys Ala  Val Thr Gly Trp Gln  Thr Ile Asp Ser Lys  Lys Tyr Tyr
    2075                2080                2085

Phe Asn  Thr Asn Thr Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile
    2090                2095                2100

Asp Gly  Lys Lys Tyr Tyr Phe  Asn Thr Asn Thr Ala  Glu Ala Ala
    2105                2110                2115

Thr Gly  Trp Gln Thr Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr
    2120                2125                2130

Asn Thr  Ala Ile Ala Ser Thr  Gly Tyr Thr Ile Ile  Asn Gly Lys
    2135                2140                2145

His Phe  Tyr Phe Asn Thr Asp  Gly Ile Met Gln Ile  Gly Val Phe
    2150                2155                2160
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Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
2330 2335 2340

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

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Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

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Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

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<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

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<400> 672

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Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
130 135 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145 150 155 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
165 170 175

Ile Tyr Asp Arg Gln Lys Arg Phe Val Asn Tyr Tyr Lys Ser Gln Ile
180 185 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu

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195 200 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
210 215 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225 230 235 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Ala Val Ala Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile

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405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
530 535 540

Asn Glu Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545 550 555 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
565 570 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
580 585 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
595 600 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp

610 615 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625 630 635 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
645 650 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
660 665 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
675 680 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
690 695 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705 710 715 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser Ile
725 730 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
740 745 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
755 760 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
770 775 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785 790 795 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Thr Ser Val Ser Pro
805 810 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser

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            820                 825                 830

Val Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
        835                 840                 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
    850                 855                 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865                 870                 875                 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
                885                 890                 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
            900                 905                 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
        915                 920                 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
    930                 935                 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945                 950                 955                 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
                965                 970                 975

Asp Leu Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
            980                 985                 990

Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Tyr Asp Ser  Ile Gln Leu
        995                 1000                1005

Val Asn  Leu Ile Ser Asn Ala  Val Asn Asp Thr Ile  Asn Val Leu
    1010                1015                1020

Pro Thr  Ile Thr Glu Gly Ile  Pro Ile Val Ser Thr  Ile Leu Asp
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1025 1030 1035

Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu His
1040 1045 1050

Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val Leu
1055 1060 1065

Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser Ile
1070 1075 1080

Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile Ala
1085 1090 1095

Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile
1100 1105 1110

Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu
1115 1120 1125

Ser Glu Ser Lys Glu Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys
1130 1135 1140

Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ala Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Lys Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp

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1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asn Gly
1235 1240 1245

Thr Lys Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile
1355 1360 1365

Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu

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1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Gly Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Ala Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ala Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Val Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp

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1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Val Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys

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1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Ala Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Ser Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asn Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Arg Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly

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2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Val Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Lys Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Ala Ser Asp Ser Lys

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2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Thr His Leu Tyr Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Val
2330 2335 2340

Ala Val Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ser Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp

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2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Ala Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala
2465 2470 2475

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Asp
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Arg Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Ile Gly Ala Asn Gly Tyr Lys Ile Ile

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2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Asn Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Asn Met Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

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<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 673

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1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

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Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240
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Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Pro Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445
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Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
    530                 535                 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545                 550                 555                 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
        595                 600                 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
    610                 615                 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625                 630                 635                 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
                645                 650                 655
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Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
            660                 665                 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
        675                 680                 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
    690                 695                 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705                 710                 715                 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser Ile
                725                 730                 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
            740                 745                 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
        755                 760                 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
    770                 775                 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785                 790                 795                 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
                805                 810                 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
            820                 825                 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
        835                 840                 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
    850                 855                 860
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Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865                 870                 875                 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
                885                 890                 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
            900                 905                 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
        915                 920                 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
    930                 935                 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945                 950                 955                 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
                965                 970                 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
            980                 985                 990

Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Tyr Asp Ser  Ile Gln Leu
        995                 1000                1005

Val Asn  Leu Ile Ser Asn Ala  Val Asn Asp Thr Ile  Asn Val Leu
    1010                1015                1020

Pro Thr  Ile Thr Glu Gly Ile  Pro Ile Val Ser Thr  Ile Leu Asp
    1025                1030                1035

Gly Ile  Asn Leu Gly Ala Ala  Ile Lys Glu Leu Leu  Asp Glu His
    1040                1045                1050

Asp Pro  Leu Leu Lys Lys Glu  Leu Glu Ala Lys Val  Gly Val Leu
    1055                1060                1065
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Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser Ile
1070 1075 1080

Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile Ala
1085 1090 1095

Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile
1100 1105 1110

Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu
1115 1120 1125

Ser Glu Ser Lys Glu Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys
1130 1135 1140

Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Tyr Ile Ser Ser His Ile Pro Ser Leu Ser Val
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Lys Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asn Gly
1235 1240 1245

Thr Lys Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

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Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Thr Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asp Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Met Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Asn Leu Ile
1355 1360 1365

Glu Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

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Tyr Asn  Tyr Thr Asp Glu Ser  Asn Asn Lys Tyr Phe  Gly Ala Ile
    1460                1465                1470

Ser Lys  Thr Ser Gln Lys Ser  Ile Ile His Tyr Lys  Lys Asp Ser
    1475                1480                1485

Lys Asn  Ile Leu Glu Phe Tyr  Asn Gly Ser Thr Leu  Glu Phe Asn
    1490                1495                1500

Ser Lys  Asp Phe Ile Ala Glu  Asp Ile Asn Val Phe  Met Lys Asp
    1505                1510                1515

Asp Ile  Asn Thr Ile Thr Gly  Lys Tyr Tyr Val Asp  Asn Asn Thr
    1520                1525                1530

Asp Lys  Ser Ile Asp Phe Ser  Ile Ser Leu Val Ser  Lys Asn Gln
    1535                1540                1545

Val Lys  Val Asn Gly Leu Tyr  Leu Asn Glu Ser Val  Tyr Ser Ser
    1550                1555                1560

Tyr Leu  Asp Phe Val Lys Asn  Ser Asp Gly His His  Asn Thr Ser
    1565                1570                1575

Asn Phe  Met Asn Leu Phe Leu  Asn Asn Ile Ser Phe  Trp Lys Leu
    1580                1585                1590

Phe Gly  Phe Glu Asn Ile Asn  Phe Val Ile Asp Lys  Tyr Phe Thr
    1595                1600                1605

Leu Val  Gly Lys Thr Asn Leu  Gly Tyr Val Glu Phe  Ile Cys Asp
    1610                1615                1620

Asn Asn  Lys Asn Ile Asp Ile  Tyr Phe Gly Glu Trp  Lys Thr Ser
    1625                1630                1635

Ser Ser  Lys Ser Thr Ile Phe  Ser Gly Asn Gly Arg  Asn Val Val
    1640                1645                1650
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Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Ser Asn
1835 1840 1845

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Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Ser Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asn Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

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Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

Tyr Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Val Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr His
2165 2170 2175

Asn Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Lys Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Ile Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Thr His Leu Cys Thr Ile Asn
2225 2230 2235

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Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Ser Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Val
2330 2335 2340

Ala Val Thr Gly Trp Gln Thr Ile Asp Gly Glu Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Arg Tyr Tyr Phe Asn Thr Asn Thr Tyr Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
2420 2425 2430

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Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Tyr Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asp Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Ala Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

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Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Ser Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

<210> 674
<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 674

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu

65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
130 135 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145 150 155 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
165 170 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
180 185 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
195 200 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
210 215 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225 230 235 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Ala Val Ala Met Leu

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275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu

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485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
    530                 535                 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545                 550                 555                 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
        595                 600                 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
    610                 615                 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625                 630                 635                 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
                645                 650                 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
            660                 665                 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
        675                 680                 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
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690 695 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705 710 715 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
725 730 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
740 745 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
755 760 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
770 775 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785 790 795 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
805 810 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
820 825 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
835 840 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
850 855 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865 870 875 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
885 890 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val

900 905 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
915 920 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
930 935 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945 950 955 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
965 970 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
980 985 990

Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln Leu
995 1000 1005

Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val Leu
1010 1015 1020

Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu Asp
1025 1030 1035

Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu His
1040 1045 1050

Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val Leu
1055 1060 1065

Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser Ile
1070 1075 1080

Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile Ala
1085 1090 1095

Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile

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1100 1105 1110

Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu
1115 1120 1125

Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys
1130 1135 1140

Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asn Gly
1235 1240 1245

Thr Lys Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile

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    1295                1300                1305

Arg Asn  Lys Leu Ser Tyr Ser  Phe Asp Gly Ala Gly  Gly Thr Tyr
    1310                1315                1320

Ser Leu  Leu Leu Ser Ser Tyr  Pro Ile Ser Thr Asn  Ile Asn Leu
    1325                1330                1335

Ser Lys  Asp Asp Leu Trp Ile  Phe Asn Ile Asp Asn  Glu Val Arg
    1340                1345                1350

Glu Ile  Ser Ile Glu Asn Gly  Thr Ile Lys Lys Gly  Lys Leu Ile
    1355                1360                1365

Lys Asp  Val Leu Ser Lys Ile  Asp Ile Asn Lys Asn  Lys Leu Ile
    1370                1375                1380

Ile Gly  Asn Gln Thr Ile Asp  Phe Ser Gly Asp Ile  Asp Asn Lys
    1385                1390                1395

Asp Arg  Tyr Ile Phe Leu Thr  Cys Glu Leu Asp Asp  Lys Ile Ser
    1400                1405                1410

Leu Ile  Ile Glu Ile Asn Leu  Val Ala Lys Ser Tyr  Ser Leu Leu
    1415                1420                1425

Leu Ser  Gly Asp Lys Asn Tyr  Leu Ile Ser Asn Leu  Ser Asn Thr
    1430                1435                1440

Ile Glu  Lys Ile Asn Thr Leu  Gly Leu Asp Ser Lys  Asn Ile Ala
    1445                1450                1455

Tyr Asn  Tyr Thr Asp Glu Ser  Asn Asn Lys Tyr Phe  Gly Ala Ile
    1460                1465                1470

Ser Lys  Thr Ser Gln Lys Ser  Ile Ile His Tyr Lys  Lys Asp Ser
    1475                1480                1485

Lys Asn  Ile Leu Glu Phe Tyr  Asn Gly Ser Thr Leu  Glu Phe Asn
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1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile

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1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly

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1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asp Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr

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2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe

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2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr Tyr Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
2330 2335 2340

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala

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2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr

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2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

<210> 675
<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 675

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

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Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320
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Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525
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Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
    530                 535                 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545                 550                 555                 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
        595                 600                 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
    610                 615                 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625                 630                 635                 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
                645                 650                 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
            660                 665                 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
        675                 680                 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
    690                 695                 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705                 710                 715                 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
                725                 730                 735
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Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
            740                 745                 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
        755                 760                 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
    770                 775                 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785                 790                 795                 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
                805                 810                 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
            820                 825                 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
        835                 840                 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
    850                 855                 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865                 870                 875                 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
                885                 890                 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
            900                 905                 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
        915                 920                 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
    930                 935                 940
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Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945                 950                 955                 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
                965                 970                 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
            980                 985                 990

Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Tyr Asp Ser  Ile Gln Leu
        995                 1000                1005

Val Asn  Leu Ile Ser Asn Ala  Val Asn Asp Thr Ile  Asn Val Leu
    1010                1015                1020

Pro Thr  Ile Thr Glu Gly Ile  Pro Ile Val Ser Thr  Ile Leu Asp
    1025                1030                1035

Gly Ile  Asn Leu Gly Ala Ala  Ile Lys Glu Leu Leu  Asp Glu His
    1040                1045                1050

Asp Pro  Leu Leu Lys Lys Glu  Leu Glu Ala Lys Val  Gly Val Leu
    1055                1060                1065

Ala Ile  Asn Met Ser Leu Ser  Ile Ala Ala Thr Val  Ala Ser Ile
    1070                1075                1080

Val Gly  Ile Gly Ala Glu Val  Thr Ile Phe Leu Leu  Pro Ile Ala
    1085                1090                1095

Gly Ile  Ser Ala Gly Ile Pro  Ser Leu Val Asn Asn  Glu Leu Ile
    1100                1105                1110

Leu His  Asp Lys Ala Thr Ser  Val Val Asn Tyr Phe  Asn His Leu
    1115                1120                1125

Ser Glu  Ser Lys Lys Tyr Gly  Pro Leu Lys Thr Glu  Asp Asp Lys
    1130                1135                1140
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Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly
1235 1240 1245

Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
1325 1330 1335

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Ser Lys  Asp Asp Leu Trp Ile  Phe Asn Ile Asp Asn  Glu Val Arg
    1340                1345                1350

Glu Ile  Ser Ile Glu Asn Gly  Thr Ile Lys Lys Gly  Lys Leu Ile
    1355                1360                1365

Lys Asp  Val Leu Ser Lys Ile  Asp Ile Asn Lys Asn  Lys Leu Ile
    1370                1375                1380

Ile Gly  Asn Gln Thr Ile Asp  Phe Ser Gly Asp Ile  Asp Asn Lys
    1385                1390                1395

Asp Arg  Tyr Ile Phe Leu Thr  Cys Glu Leu Asp Asp  Lys Ile Ser
    1400                1405                1410

Leu Ile  Ile Glu Ile Asn Leu  Val Ala Lys Ser Tyr  Ser Leu Leu
    1415                1420                1425

Leu Ser  Gly Asp Lys Asn Tyr  Leu Ile Ser Asn Leu  Ser Asn Thr
    1430                1435                1440

Ile Glu  Lys Ile Asn Thr Leu  Gly Leu Asp Ser Lys  Asn Ile Ala
    1445                1450                1455

Tyr Asn  Tyr Thr Asp Glu Ser  Asn Asn Lys Tyr Phe  Gly Ala Ile
    1460                1465                1470

Ser Lys  Thr Ser Gln Lys Ser  Ile Ile His Tyr Lys  Lys Asp Ser
    1475                1480                1485

Lys Asn  Ile Leu Glu Phe Tyr  Asn Asp Ser Thr Leu  Glu Phe Asn
    1490                1495                1500

Ser Lys  Asp Phe Ile Ala Glu  Asp Ile Asn Val Phe  Met Lys Asp
    1505                1510                1515

Asp Ile  Asn Thr Ile Thr Gly  Lys Tyr Tyr Val Asp  Asn Asn Thr
    1520                1525                1530
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Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

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Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

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Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

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Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

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Lys Tyr  Tyr Phe Asp Asn Asp  Ser Lys Ala Val Thr  Gly Trp Gln
    2315                 2320                 2325

Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn Leu Asn  Thr Ala Glu
    2330                 2335                 2340

Ala Ala  Thr Gly Trp Gln Thr  Ile Asp Gly Lys Lys  Tyr Tyr Phe
    2345                 2350                 2355

Asn Leu  Asn Thr Ala Glu Ala  Ala Thr Gly Trp Gln  Thr Ile Asp
    2360                 2365                 2370

Gly Lys  Lys Tyr Tyr Phe Asn  Thr Asn Thr Phe Ile  Ala Ser Thr
    2375                 2380                 2385

Gly Tyr  Thr Ser Ile Asn Gly  Lys His Phe Tyr Phe  Asn Thr Asp
    2390                 2395                 2400

Gly Ile  Met Gln Ile Gly Val  Phe Lys Gly Pro Asn  Gly Phe Glu
    2405                 2410                 2415

Tyr Phe  Ala Pro Ala Asn Thr  His Asn Asn Asn Ile  Glu Gly Gln
    2420                 2425                 2430

Ala Ile  Leu Tyr Gln Asn Lys  Phe Leu Thr Leu Asn  Gly Lys Lys
    2435                 2440                 2445

Tyr Tyr  Phe Gly Ser Asp Ser  Lys Ala Val Thr Gly  Leu Arg Thr
    2450                 2455                 2460

Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr Asn Thr  Ala Val Ala
    2465                 2470                 2475

Val Thr  Gly Trp Gln Thr Ile  Asn Gly Lys Lys Tyr  Tyr Phe Asn
    2480                 2485                 2490

Thr Asn  Thr Ser Ile Ala Ser  Thr Gly Tyr Thr Ile  Ile Ser Gly
    2495                 2500                 2505
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Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

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Ala Pro Gly Ile Tyr Gly
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<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 676

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Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
130 135 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln

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145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Val Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
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355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
530 535 540

Asn Glu Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545 550 555 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys

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565 570 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
580 585 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
595 600 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
610 615 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625 630 635 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
645 650 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
660 665 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
675 680 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
690 695 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705 710 715 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser Ile
725 730 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
740 745 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
755 760 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile

770 775 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785 790 795 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Thr Ser Val Ser Pro
805 810 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
820 825 830

Val Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
835 840 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
850 855 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865 870 875 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
885 890 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
900 905 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
915 920 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
930 935 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945 950 955 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
965 970 975

Asp Leu Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala

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            980                 985                 990

Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Tyr Asp Ser  Ile Gln Leu
        995                1000                1005

Val Asn  Leu Ile Ser Asn Ala  Val Asn Asp Thr Ile  Asn Val Leu
    1010                1015                1020

Pro Thr  Ile Thr Glu Gly Ile  Pro Ile Val Ser Thr  Ile Leu Asp
    1025                1030                1035

Gly Ile  Asn Leu Gly Ala Ala  Ile Lys Glu Leu Leu  Asp Glu His
    1040                1045                1050

Asp Pro  Leu Leu Lys Lys Glu  Leu Glu Ala Lys Val  Gly Val Leu
    1055                1060                1065

Ala Ile  Asn Met Ser Leu Ser  Ile Ala Ala Thr Val  Ala Ser Ile
    1070                1075                1080

Val Gly  Ile Gly Ala Glu Val  Thr Ile Phe Leu Leu  Pro Ile Ala
    1085                1090                1095

Gly Ile  Ser Ala Gly Ile Pro  Ser Leu Val Asn Asn  Glu Leu Ile
    1100                1105                1110

Leu His  Asp Lys Ala Thr Ser  Val Val Asn Tyr Phe  Asn His Leu
    1115                1120                1125

Ser Glu  Ser Lys Glu Tyr Gly  Pro Leu Lys Thr Glu  Asp Asp Lys
    1130                1135                1140

Ile Leu  Val Pro Ile Asp Asp  Leu Val Ile Ser Glu  Ile Asp Phe
    1145                1150                1155

Asn Asn  Asn Ala Ile Lys Leu  Gly Thr Cys Asn Ile  Leu Ala Met
    1160                1165                1170

Glu Gly  Gly Ser Gly His Thr  Val Thr Gly Asn Ile  Asp His Phe
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1175 1180 1185

Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Lys Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asn Gly
1235 1240 1245

Thr Lys Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile
1355 1360 1365

Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile

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1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Gly Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Ala Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ala Asp Gly His His Asn Thr Ser

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1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Val Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser

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1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Val Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Ala Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Ser Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asn Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Arg Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val

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1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Val Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe

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2150 2155 2160

Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Lys Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Ala Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Thr His Leu Tyr Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Val
2330 2335 2340

Ala Val Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe

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2345 2350 2355

Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ser Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Ala Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala
2465 2470 2475

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Asp
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg

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2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Arg Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Ile Gly Ala Asn Gly Tyr Lys Ile Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Asn Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Asn Met Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

<210> 677
<211> 2709
<212> PRT
<213> Artificial Sequence

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<220>
<223> Synthetic amino acid sequence

<400> 677

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Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
            20                  25                  30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190
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Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400
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```
Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
    530                 535                 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545                 550                 555                 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
        595                 600                 605
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```
Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
    610                 615                 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625                 630                 635                 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
                645                 650                 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
            660                 665                 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
        675                 680                 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
    690                 695                 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705                 710                 715                 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
                725                 730                 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
            740                 745                 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
        755                 760                 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
    770                 775                 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785                 790                 795                 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
                805                 810                 815
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Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
            820                 825                 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
        835                 840                 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
    850                 855                 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865                 870                 875                 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
                885                 890                 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
            900                 905                 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
        915                 920                 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
    930                 935                 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945                 950                 955                 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
                965                 970                 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
            980                 985                 990

Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Tyr Asp Ser  Ile Gln Leu
        995                 1000                1005

Val Asn  Leu Ile Ser Asn Ala  Val Asn Asp Thr Ile  Asn Val Leu
    1010                1015                1020
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Pro Thr  Ile Thr Glu Gly Ile  Pro Ile Val Ser Thr  Ile Leu Asp
    1025                1030                1035

Gly Ile  Asn Leu Gly Ala Ala  Ile Lys Glu Leu Leu  Asp Glu His
    1040                1045                1050

Asp Pro  Leu Leu Lys Lys Glu  Leu Glu Ala Lys Val  Gly Val Leu
    1055                1060                1065

Ala Ile  Asn Met Ser Leu Ser  Ile Ala Ala Thr Val  Ala Ser Ile
    1070                1075                1080

Val Gly  Ile Gly Ala Glu Val  Thr Ile Phe Leu Leu  Pro Ile Ala
    1085                1090                1095

Gly Ile  Ser Ala Gly Ile Pro  Ser Leu Val Asn Asn  Glu Leu Ile
    1100                1105                1110

Leu His  Asp Lys Ala Thr Ser  Val Val Asn Tyr Phe  Asn His Leu
    1115                1120                1125

Ser Glu  Ser Lys Lys Tyr Gly  Pro Leu Lys Thr Glu  Asp Asp Lys
    1130                1135                1140

Ile Leu  Val Pro Ile Asp Asp  Leu Val Ile Ser Glu  Ile Asp Phe
    1145                1150                1155

Asn Asn  Asn Ser Ile Lys Leu  Gly Thr Cys Asn Ile  Leu Ala Met
    1160                1165                1170

Glu Gly  Gly Ser Gly His Thr  Val Thr Gly Asn Ile  Asp His Phe
    1175                1180                1185

Phe Ser  Ser Pro Ser Ile Ser  Ser His Ile Pro Ser  Leu Ser Ile
    1190                1195                1200

Tyr Ser  Ala Ile Gly Ile Glu  Thr Glu Asn Leu Asp  Phe Ser Lys
    1205                1210                1215
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Lys Ile  Met Met Leu Pro Asn  Ala Pro Ser Arg Val  Phe Trp Trp
    1220                1225                1230

Glu Thr  Gly Ala Val Pro Gly  Leu Arg Ser Leu Glu  Asn Asp Gly
    1235                1240                1245

Thr Arg  Leu Leu Asp Ser Ile  Arg Asp Leu Tyr Pro  Gly Lys Phe
    1250                1255                1260

Tyr Trp  Arg Phe Tyr Ala Phe  Phe Asp Tyr Ala Ile  Thr Thr Leu
    1265                1270                1275

Lys Pro  Val Tyr Glu Asp Thr  Asn Ile Lys Ile Lys  Leu Asp Lys
    1280                1285                1290

Asp Thr  Arg Asn Phe Ile Met  Pro Thr Ile Thr Thr  Asn Glu Ile
    1295                1300                1305

Arg Asn  Lys Leu Ser Tyr Ser  Phe Asp Gly Ala Gly  Gly Thr Tyr
    1310                1315                1320

Ser Leu  Leu Leu Ser Ser Tyr  Pro Ile Ser Thr Asn  Ile Asn Leu
    1325                1330                1335

Ser Lys  Asp Asp Leu Trp Ile  Phe Asn Ile Asp Asn  Glu Val Arg
    1340                1345                1350

Glu Ile  Ser Ile Glu Asn Gly  Thr Ile Lys Lys Gly  Lys Leu Ile
    1355                1360                1365

Lys Asp  Val Leu Ser Lys Ile  Asp Ile Asn Lys Asn  Lys Leu Ile
    1370                1375                1380

Ile Gly  Asn Gln Thr Ile Asp  Phe Ser Gly Asp Ile  Asp Asn Lys
    1385                1390                1395

Asp Arg  Tyr Ile Phe Leu Thr  Cys Glu Leu Asp Asp  Lys Ile Ser
    1400                1405                1410
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Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

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Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

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Glu Leu  Asp Arg Asp His Leu  Gly Phe Lys Ile Ile  Asp Asn Lys
    1805                1810                1815

Thr Tyr  Tyr Tyr Asp Glu Asp  Ser Lys Leu Val Lys  Gly Leu Ile
    1820                1825                1830

Asn Ile  Asn Asn Ser Leu Phe  Tyr Phe Asp Pro Ile  Glu Phe Asn
    1835                1840                1845

Leu Val  Thr Gly Trp Gln Thr  Ile Asn Gly Lys Lys  Tyr Tyr Phe
    1850                1855                1860

Asp Ile  Asn Thr Gly Ala Ala  Leu Thr Ser Tyr Lys  Ile Ile Asn
    1865                1870                1875

Gly Lys  His Phe Tyr Phe Asn  Asn Asp Gly Val Met  Gln Leu Gly
    1880                1885                1890

Val Phe  Lys Gly Pro Asp Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    1895                1900                1905

Thr Gln  Asn Asn Asn Ile Glu  Gly Gln Ala Ile Val  Tyr Gln Ser
    1910                1915                1920

Lys Phe  Leu Thr Leu Asn Gly  Lys Lys Tyr Tyr Phe  Asp Asn Asp
    1925                1930                1935

Ser Lys  Ala Val Thr Gly Trp  Arg Ile Ile Asn Asn  Glu Lys Tyr
    1940                1945                1950

Tyr Phe  Asn Pro Asn Asn Ala  Ile Ala Ala Val Gly  Leu Gln Val
    1955                1960                1965

Ile Asp  Asn Asn Lys Tyr Tyr  Phe Asn Pro Asp Thr  Ala Ile Ile
    1970                1975                1980

Ser Lys  Gly Trp Gln Thr Val  Asn Gly Ser Arg Tyr  Tyr Phe Asp
    1985                1990                1995
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Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Lys Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe
2180 2185 2190

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Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr Tyr Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
2330 2335 2340

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

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Gly Tyr  Thr Ser Ile Asn Gly  Lys His Phe Tyr Phe  Asn Thr Asp
    2390                2395                2400

Gly Ile  Met Gln Ile Gly Val  Phe Lys Gly Pro Asn  Gly Phe Glu
    2405                2410                2415

Tyr Phe  Ala Pro Ala Asn Thr  His Asn Asn Asn Ile  Glu Gly Gln
    2420                2425                2430

Ala Ile  Leu Tyr Gln Asn Lys  Phe Leu Thr Leu Asn  Gly Lys Lys
    2435                2440                2445

Tyr Tyr  Phe Gly Ser Asp Ser  Lys Ala Val Thr Gly  Leu Arg Thr
    2450                2455                2460

Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr Asn Thr  Ala Val Ala
    2465                2470                2475

Val Thr  Gly Trp Gln Thr Ile  Asn Gly Lys Lys Tyr  Tyr Phe Asn
    2480                2485                2490

Thr Asn  Thr Ser Ile Ala Ser  Thr Gly Tyr Thr Ile  Ile Ser Gly
    2495                2500                2505

Lys His  Phe Tyr Phe Asn Thr  Asp Gly Ile Met Gln  Ile Gly Val
    2510                2515                2520

Phe Lys  Gly Pro Asp Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr
    2525                2530                2535

Asp Ala  Asn Asn Ile Glu Gly  Gln Ala Ile Arg Tyr  Gln Asn Arg
    2540                2545                2550

Phe Leu  Tyr Leu His Asp Asn  Ile Tyr Tyr Phe Gly  Asn Asn Ser
    2555                2560                2565

Lys Ala  Ala Thr Gly Trp Val  Thr Ile Asp Gly Asn  Arg Tyr Tyr
    2570                2575                2580
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Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

<210> 678
<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 678

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr

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20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
130 135 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145 150 155 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
165 170 175

Ile Tyr Asp Arg Gln Lys Arg Phe Val Asn Tyr Tyr Lys Ser Gln Ile
180 185 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
195 200 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
210 215 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala

225 230 235 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Ala Val Ala Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile

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435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
530 535 540

Asn Glu Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545 550 555 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
565 570 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
580 585 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
595 600 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
610 615 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625 630 635 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys

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645 650 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
660 665 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
675 680 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
690 695 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705 710 715 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser Ile
725 730 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
740 745 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
755 760 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
770 775 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785 790 795 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Thr Ser Val Ser Pro
805 810 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
820 825 830

Val Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
835 840 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu

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    850                 855                 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865                 870                 875                 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
                885                 890                 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
            900                 905                 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
        915                 920                 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
    930                 935                 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945                 950                 955                 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
                965                 970                 975

Asp Leu Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
            980                 985                 990

Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Tyr Asp Ser  Ile Gln Leu
        995                 1000                1005

Val Asn  Leu Ile Ser Asn Ala  Val Asn Asp Thr Ile  Asn Val Leu
    1010                1015                1020

Pro Thr  Ile Thr Glu Gly Ile  Pro Ile Val Ser Thr  Ile Leu Asp
    1025                1030                1035

Gly Ile  Asn Leu Gly Ala Ala  Ile Lys Glu Leu Leu  Asp Glu His
    1040                1045                1050

Asp Pro  Leu Leu Lys Lys Glu  Leu Glu Ala Lys Val  Gly Val Leu
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1055 1060 1065

Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser Ile
1070 1075 1080

Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile Ala
1085 1090 1095

Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile
1100 1105 1110

Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu
1115 1120 1125

Ser Glu Ser Lys Glu Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys
1130 1135 1140

Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ala Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Lys Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asn Gly
1235 1240 1245

Thr Lys Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe

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1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile
1355 1360 1365

Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala

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1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Gly Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Ala Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ala Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Val Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val

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    1640                1645                1650

Val Glu  Pro Ile Tyr Asn Pro  Asp Thr Gly Glu Asp  Ile Ser Thr
    1655                1660                1665

Ser Leu  Asp Phe Ser Tyr Glu  Pro Leu Tyr Gly Ile  Asp Arg Tyr
    1670                1675                1680

Ile Asn  Lys Val Leu Ile Ala  Pro Asp Leu Tyr Thr  Ser Leu Ile
    1685                1690                1695

Asn Ile  Asn Thr Asn Tyr Tyr  Ser Asn Glu Tyr Tyr  Pro Glu Ile
    1700                1705                1710

Ile Val  Leu Asn Pro Asn Thr  Phe His Lys Lys Val  Asn Ile Asn
    1715                1720                1725

Leu Asp  Ser Ser Ser Phe Glu  Tyr Lys Trp Ser Thr  Glu Gly Ser
    1730                1735                1740

Asp Phe  Ile Leu Val Arg Tyr  Leu Glu Glu Ser Asn  Lys Lys Ile
    1745                1750                1755

Leu Gln  Lys Ile Arg Ile Lys  Gly Ile Leu Ser Asn  Thr Gln Ser
    1760                1765                1770

Phe Asn  Lys Met Ser Ile Asp  Phe Lys Asp Ile Lys  Lys Leu Ser
    1775                1780                1785

Leu Val  Tyr Ile Met Ser Asn  Phe Lys Ser Phe Asn  Ser Glu Asn
    1790                1795                1800

Glu Leu  Asp Arg Asp His Leu  Gly Phe Lys Ile Ile  Asp Asn Lys
    1805                1810                1815

Thr Tyr  Tyr Tyr Asp Glu Ala  Ser Lys Leu Val Lys  Gly Leu Ile
    1820                1825                1830

Asn Ile  Asn Asn Ser Leu Phe  Tyr Phe Asp Pro Ile  Glu Ser Asn
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1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asn Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Arg Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr

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2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Val Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Lys Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Ala Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Thr His Leu Tyr Thr Ile Asn

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2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Val
2330 2335 2340

Ala Val Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ser Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln

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2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Ala Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala
2465 2470 2475

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Asp
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Arg Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Ile Gly Ala Asn Gly Tyr Lys Ile Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn

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2615 2620 2625

Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Asn Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Asn Met Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

<210> 679
<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 679

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
50 55 60

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Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Thr Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270
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Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Ala Val Ala Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

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```
Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
    530                 535                 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545                 550                 555                 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
        595                 600                 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
    610                 615                 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625                 630                 635                 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
                645                 650                 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
            660                 665                 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
        675                 680                 685
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Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
    690                 695                 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705                 710                 715                 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser Ile
                725                 730                 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
            740                 745                 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
        755                 760                 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
    770                 775                 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785                 790                 795                 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
                805                 810                 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
            820                 825                 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
        835                 840                 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
    850                 855                 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865                 870                 875                 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
                885                 890                 895
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```
Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
            900                 905                 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
        915                 920                 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
    930                 935                 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945                 950                 955                 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
                965                 970                 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
            980                 985                 990

Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Tyr Asp Ser  Ile Gln Leu
        995                 1000                1005

Val Asn  Leu Ile Ser Asn Ala  Val Asn Asp Thr Ile  Asn Val Leu
    1010                1015                1020

Pro Thr  Ile Thr Glu Gly Ile  Pro Ile Val Ser Thr  Ile Leu Asp
    1025                1030                1035

Gly Ile  Asn Leu Gly Ala Ala  Ile Lys Glu Leu Leu  Asp Glu His
    1040                1045                1050

Asp Pro  Leu Leu Lys Lys Glu  Leu Glu Ala Lys Val  Gly Val Leu
    1055                1060                1065

Ala Ile  Asn Met Ser Leu Ser  Ile Ala Ala Thr Val  Ala Ser Ile
    1070                1075                1080

Val Gly  Ile Gly Ala Glu Val  Thr Ile Phe Leu Leu  Pro Ile Ala
    1085                1090                1095
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Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile
1100 1105 1110

Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu
1115 1120 1125

Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys
1130 1135 1140

Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Tyr Ile Ser Ser His Ile Pro Ser Leu Ser Val
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Lys Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly
1235 1240 1245

Thr Lys Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Thr Lys Ile Lys Leu Asp Lys
1280 1285 1290

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```
Asp Thr  Arg Asn Phe Ile Met  Pro Thr Ile Thr Thr  Asp Glu Ile
    1295                1300                1305

Arg Asn  Lys Leu Ser Tyr Ser  Phe Asp Gly Ala Gly  Gly Thr Tyr
    1310                1315                1320

Ser Leu  Leu Leu Ser Ser Tyr  Pro Ile Ser Met Asn  Ile Asn Leu
    1325                1330                1335

Ser Lys  Asp Asp Leu Trp Ile  Phe Asn Ile Asp Asn  Glu Val Arg
    1340                1345                1350

Glu Ile  Ser Ile Glu Asn Gly  Thr Ile Lys Lys Gly  Asn Leu Ile
    1355                1360                1365

Glu Asp  Val Leu Ser Lys Ile  Asp Ile Asn Lys Asn  Lys Leu Ile
    1370                1375                1380

Ile Gly  Asn Gln Thr Ile Asp  Phe Ser Gly Asp Ile  Asp Asn Lys
    1385                1390                1395

Asp Arg  Tyr Ile Phe Leu Thr  Cys Glu Leu Asp Asp  Lys Ile Ser
    1400                1405                1410

Leu Ile  Ile Glu Ile Asn Leu  Val Ala Lys Ser Tyr  Ser Leu Leu
    1415                1420                1425

Leu Ser  Gly Asp Lys Asn Tyr  Leu Ile Ser Asn Leu  Ser Asn Thr
    1430                1435                1440

Ile Glu  Lys Ile Asn Thr Leu  Gly Leu Asp Ser Lys  Asn Ile Ala
    1445                1450                1455

Tyr Asn  Tyr Thr Asp Glu Ser  Asn Asn Lys Tyr Phe  Gly Ala Ile
    1460                1465                1470

Ser Lys  Thr Ser Gln Lys Ser  Ile Ile His Tyr Lys  Lys Asp Ser
    1475                1480                1485
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Lys Asn Ile Leu Glu Phe Tyr Asn Gly Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asn Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Leu
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

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Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Ser Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Ser Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

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Gly Lys His Phe Tyr Phe Asn Asn Asn Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

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Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Lys Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Ile Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Thr His Leu Cys Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

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```
Glu Ser  Lys Met Val Thr Gly  Val Phe Lys Gly Pro  Asn Gly Phe
    2270                2275                2280

Glu Tyr  Phe Ala Pro Ala Asn  Thr His Asn Asn Asn  Ile Glu Gly
    2285                2290                2295

Gln Ala  Ile Val Tyr Gln Asn  Lys Phe Leu Thr Leu  Asn Gly Lys
    2300                2305                2310

Lys Tyr  Tyr Phe Asp Asn Asp  Ser Lys Ala Val Thr  Gly Trp Gln
    2315                2320                2325

Thr Ile  Asp Ser Lys Lys Tyr  Tyr Phe Asn Leu Asn  Thr Ala Val
    2330                2335                2340

Ala Val  Thr Gly Trp Gln Thr  Ile Asp Gly Glu Lys  Tyr Tyr Phe
    2345                2350                2355

Asn Leu  Asn Thr Ala Glu Ala  Ala Thr Gly Trp Gln  Thr Ile Asp
    2360                2365                2370

Gly Lys  Arg Tyr Tyr Phe Asn  Thr Asn Thr Tyr Ile  Ala Ser Thr
    2375                2380                2385

Gly Tyr  Thr Ile Ile Asn Gly  Lys His Phe Tyr Phe  Asn Thr Asp
    2390                2395                2400

Gly Ile  Met Gln Ile Gly Val  Phe Lys Gly Pro Asp  Gly Phe Glu
    2405                2410                2415

Tyr Phe  Ala Pro Ala Asn Thr  His Asn Asn Asn Ile  Glu Gly Gln
    2420                2425                2430

Ala Ile  Leu Tyr Gln Asn Lys  Phe Leu Thr Leu Asn  Gly Lys Lys
    2435                2440                2445

Tyr Tyr  Phe Gly Ser Asp Ser  Lys Ala Val Thr Gly  Leu Arg Thr
    2450                2455                2460
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Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Tyr Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asp Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Ala Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Asn Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

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Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

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<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 680

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr

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            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Thr Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
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305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln

515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
530 535 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545 550 555 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
565 570 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
580 585 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
595 600 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
610 615 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625 630 635 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
645 650 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
660 665 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
675 680 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
690 695 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705 710 715 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser Ile

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725 730 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
740 745 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
755 760 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
770 775 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785 790 795 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
805 810 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
820 825 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
835 840 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
850 855 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865 870 875 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
885 890 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
900 905 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
915 920 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn

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930 935 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945 950 955 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
965 970 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
980 985 990

Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln Leu
995 1000 1005

Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val Leu
1010 1015 1020

Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu Asp
1025 1030 1035

Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu His
1040 1045 1050

Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val Leu
1055 1060 1065

Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser Ile
1070 1075 1080

Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile Ala
1085 1090 1095

Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile
1100 1105 1110

Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu
1115 1120 1125

Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys

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1130 1135 1140

Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Tyr Ile Ser Ser His Ile Pro Ser Leu Ser Val
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Lys Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly
1235 1240 1245

Thr Lys Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Thr Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asp Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Met Asn Ile Asn Leu

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1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Asn Leu Ile
1355 1360 1365

Glu Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Gly Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr

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1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asn Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Leu
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn

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1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Ser Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Ser Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asn Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser

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1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala

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2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Lys Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Ile Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Thr His Leu Cys Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys

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2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Ser Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Val
2330 2335 2340

Ala Val Thr Gly Trp Gln Thr Ile Asp Gly Glu Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Arg Tyr Tyr Phe Asn Thr Asn Thr Tyr Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Tyr Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly

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2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asp Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Ala Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Asn Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys

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2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

<210> 681
<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 681

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
130 135 140

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Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Thr Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350
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Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
    530                 535                 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545                 550                 555                 560
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Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
        595                 600                 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
    610                 615                 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625                 630                 635                 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
                645                 650                 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
            660                 665                 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
        675                 680                 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
    690                 695                 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705                 710                 715                 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser Ile
                725                 730                 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
            740                 745                 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
        755                 760                 765
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```
Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
    770                 775                 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785                 790                 795                 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
                805                 810                 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
            820                 825                 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
        835                 840                 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
    850                 855                 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865                 870                 875                 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
                885                 890                 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
            900                 905                 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
        915                 920                 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
    930                 935                 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945                 950                 955                 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
                965                 970                 975
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Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
            980                 985                 990

Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Tyr Asp Ser  Ile Gln Leu
        995                 1000                1005

Val Asn  Leu Ile Ser Asn Ala  Val Asn Asp Thr Ile  Asn Val Leu
    1010                1015                1020

Pro Thr  Ile Thr Glu Gly Ile  Pro Ile Val Ser Thr  Ile Leu Asp
    1025                1030                1035

Gly Ile  Asn Leu Gly Ala Ala  Ile Lys Glu Leu Leu  Asp Glu His
    1040                1045                1050

Asp Pro  Leu Leu Lys Lys Glu  Leu Glu Ala Lys Val  Gly Val Leu
    1055                1060                1065

Ala Ile  Asn Met Ser Leu Ser  Ile Ala Ala Thr Val  Ala Ser Ile
    1070                1075                1080

Val Gly  Ile Gly Ala Glu Val  Thr Ile Phe Leu Leu  Pro Ile Ala
    1085                1090                1095

Gly Ile  Ser Ala Gly Ile Pro  Ser Leu Val Asn Asn  Glu Leu Ile
    1100                1105                1110

Leu His  Asp Lys Ala Thr Ser  Val Val Asn Tyr Phe  Asn His Leu
    1115                1120                1125

Ser Glu  Ser Lys Lys Tyr Gly  Pro Leu Lys Thr Glu  Asp Asp Lys
    1130                1135                1140

Ile Leu  Val Pro Ile Asp Asp  Leu Val Ile Ser Glu  Ile Asp Phe
    1145                1150                1155

Asn Asn  Asn Ser Ile Lys Leu  Gly Thr Cys Asn Ile  Leu Ala Met
    1160                1165                1170
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```
Glu Gly  Gly Ser Gly His Thr  Val Thr Gly Asn Ile  Asp His Phe
    1175                 1180                 1185

Phe Ser  Ser Pro Tyr Ile Ser  Ser His Ile Pro Ser  Leu Ser Val
    1190                 1195                 1200

Tyr Ser  Ala Ile Gly Ile Lys  Thr Glu Asn Leu Asp  Phe Ser Lys
    1205                 1210                 1215

Lys Ile  Met Met Leu Pro Asn  Ala Pro Ser Arg Val  Phe Trp Trp
    1220                 1225                 1230

Glu Thr  Gly Ala Val Pro Gly  Leu Arg Ser Leu Glu  Asn Asp Gly
    1235                 1240                 1245

Thr Lys  Leu Leu Asp Ser Ile  Arg Asp Leu Tyr Pro  Gly Lys Phe
    1250                 1255                 1260

Tyr Trp  Arg Phe Tyr Ala Phe  Phe Asp Tyr Ala Ile  Thr Thr Leu
    1265                 1270                 1275

Lys Pro  Val Tyr Glu Asp Thr  Asn Thr Lys Ile Lys  Leu Asp Lys
    1280                 1285                 1290

Asp Thr  Arg Asn Phe Ile Met  Pro Thr Ile Thr Thr  Asp Glu Ile
    1295                 1300                 1305

Arg Asn  Lys Leu Ser Tyr Ser  Phe Asp Gly Ala Gly  Gly Thr Tyr
    1310                 1315                 1320

Ser Leu  Leu Leu Ser Ser Tyr  Pro Ile Ser Met Asn  Ile Asn Leu
    1325                 1330                 1335

Ser Lys  Asp Asp Leu Trp Ile  Phe Asn Ile Asp Asn  Glu Val Arg
    1340                 1345                 1350

Glu Ile  Ser Ile Glu Asn Gly  Thr Ile Lys Lys Gly  Asn Leu Ile
    1355                 1360                 1365
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```
Glu Asp  Val Leu Ser Lys Ile  Asp Ile Asn Lys Asn  Lys Leu Ile
    1370                1375                1380

Ile Gly  Asn Gln Thr Ile Asp  Phe Ser Gly Asp Ile  Asp Asn Lys
    1385                1390                1395

Asp Arg  Tyr Ile Phe Leu Thr  Cys Glu Leu Asp Asp  Lys Ile Ser
    1400                1405                1410

Leu Ile  Ile Glu Ile Asn Leu  Val Ala Lys Ser Tyr  Ser Leu Leu
    1415                1420                1425

Leu Ser  Gly Asp Lys Asn Tyr  Leu Ile Ser Asn Leu  Ser Asn Thr
    1430                1435                1440

Ile Glu  Lys Ile Asn Thr Leu  Gly Leu Asp Ser Lys  Asn Ile Ala
    1445                1450                1455

Tyr Asn  Tyr Thr Asp Glu Ser  Asn Asn Lys Tyr Phe  Gly Ala Ile
    1460                1465                1470

Ser Lys  Thr Ser Gln Lys Ser  Ile Ile His Tyr Lys  Lys Asp Ser
    1475                1480                1485

Lys Asn  Ile Leu Glu Phe Tyr  Asn Gly Ser Thr Leu  Glu Phe Asn
    1490                1495                1500

Ser Lys  Asp Phe Ile Ala Glu  Asp Ile Asn Val Phe  Met Lys Asp
    1505                1510                1515

Asp Ile  Asn Thr Ile Thr Gly  Lys Tyr Tyr Val Asp  Asn Asn Thr
    1520                1525                1530

Asp Lys  Ser Ile Asp Phe Ser  Ile Ser Leu Val Ser  Lys Asn Gln
    1535                1540                1545

Val Lys  Val Asn Gly Leu Tyr  Leu Asn Glu Ser Val  Tyr Ser Ser
    1550                1555                1560
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Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asn Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Leu
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

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Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Ser Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Ser Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asn Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

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Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

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```
His Phe  Tyr Phe Asn Thr Asp  Gly Ile Met Gln Ile  Gly Val Phe
    2150                2155                2160

Lys Gly  Pro Asn Gly Phe Glu  Tyr Phe Ala Pro Ala  Asn Thr Asp
    2165                2170                2175

Ala Asn  Asn Ile Glu Gly Gln  Ala Ile Leu Tyr Gln  Asn Lys Phe
    2180                2185                2190

Leu Thr  Leu Asn Gly Lys Lys  Tyr Tyr Phe Gly Ser  Asp Ser Lys
    2195                2200                2205

Ala Ile  Thr Gly Trp Gln Thr  Ile Asp Gly Lys Lys  Tyr Tyr Phe
    2210                2215                2220

Asn Pro  Asn Asn Ala Ile Ala  Ala Thr His Leu Cys  Thr Ile Asn
    2225                2230                2235

Asn Asp  Lys Tyr Tyr Phe Ser  Tyr Asp Gly Ile Leu  Gln Asn Gly
    2240                2245                2250

Tyr Ile  Thr Ile Glu Arg Asn  Asn Phe Tyr Phe Asp  Ala Asn Asn
    2255                2260                2265

Glu Ser  Lys Met Val Thr Gly  Val Phe Lys Gly Pro  Asn Gly Phe
    2270                2275                2280

Glu Tyr  Phe Ala Pro Ala Asn  Thr His Asn Asn Asn  Ile Glu Gly
    2285                2290                2295

Gln Ala  Ile Val Tyr Gln Asn  Lys Phe Leu Thr Leu  Asn Gly Lys
    2300                2305                2310

Lys Tyr  Tyr Phe Asp Asn Asp  Ser Lys Ala Val Thr  Gly Trp Gln
    2315                2320                2325

Thr Ile  Asp Ser Lys Lys Tyr  Tyr Phe Asn Leu Asn  Thr Ala Val
    2330                2335                2340
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Ala Val Thr Gly Trp Gln Thr Ile Asp Gly Glu Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Arg Tyr Tyr Phe Asn Thr Asn Thr Tyr Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Tyr Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

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```
Asp Ala  Asn Asn Ile Glu Gly  Gln Ala Ile Arg Tyr  Gln Asn Arg
    2540                2545                2550

Phe Leu  Tyr Leu His Asp Asn  Ile Tyr Tyr Phe Gly  Asn Asp Ser
    2555                2560                2565

Lys Ala  Ala Thr Gly Trp Ala  Thr Ile Asp Gly Asn  Arg Tyr Tyr
    2570                2575                2580

Phe Glu  Pro Asn Thr Ala Met  Gly Ala Asn Gly Tyr  Lys Thr Ile
    2585                2590                2595

Asp Asn  Lys Asn Phe Tyr Phe  Arg Asn Gly Leu Pro  Gln Ile Gly
    2600                2605                2610

Val Phe  Lys Gly Pro Asn Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2615                2620                2625

Thr Asp  Ala Asn Asn Ile Asp  Gly Gln Ala Ile Arg  Tyr Gln Asn
    2630                2635                2640

Arg Phe  Leu His Leu Leu Gly  Asn Ile Tyr Tyr Phe  Gly Asn Asn
    2645                2650                2655

Ser Lys  Ala Val Thr Gly Trp  Gln Thr Ile Asn Gly  Lys Val Tyr
    2660                2665                2670

Tyr Phe  Met Pro Asp Thr Ala  Met Ala Ala Ala Gly  Gly Leu Phe
    2675                2680                2685

Glu Ile  Asp Gly Val Ile Tyr  Phe Phe Gly Val Asp  Gly Val Lys
    2690                2695                2700

Ala Pro  Gly Ile Tyr Gly
    2705


<210>  682
<211>  2709
<212>  PRT
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<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 682

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Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1               5                  10                  15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
            20                  25                  30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
```

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            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
```

385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
530 535 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545 550 555 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
565 570 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
580 585 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile

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595 600 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
610 615 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625 630 635 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
645 650 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
660 665 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
675 680 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
690 695 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705 710 715 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
725 730 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
740 745 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
755 760 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
770 775 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785 790 795 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro

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805 810 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
820 825 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
835 840 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
850 855 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865 870 875 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
885 890 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
900 905 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
915 920 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
930 935 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945 950 955 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
965 970 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
980 985 990

Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln Leu
995 1000 1005

Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val Leu

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1010 1015 1020

Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu Asp
1025 1030 1035

Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu His
1040 1045 1050

Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val Leu
1055 1060 1065

Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser Ile
1070 1075 1080

Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile Ala
1085 1090 1095

Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile
1100 1105 1110

Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu
1115 1120 1125

Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys
1130 1135 1140

Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser Lys

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1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly
1235 1240 1245

Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile
1355 1360 1365

Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser

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1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr

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1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn

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1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp

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1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe

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2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
2330 2335 2340

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr

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2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr

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2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

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<213> Artificial Sequence

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Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
            20                  25                  30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220
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Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430
```

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```
Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
    530                 535                 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545                 550                 555                 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
        595                 600                 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
    610                 615                 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625                 630                 635                 640
```

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```
Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
                645                 650                 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
            660                 665                 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
        675                 680                 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
    690                 695                 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705                 710                 715                 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
                725                 730                 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
            740                 745                 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
        755                 760                 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
    770                 775                 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785                 790                 795                 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
                805                 810                 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
            820                 825                 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
        835                 840                 845
```

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```
Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
    850                 855                 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865                 870                 875                 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
                885                 890                 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
            900                 905                 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
        915                 920                 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
    930                 935                 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945                 950                 955                 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
                965                 970                 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
            980                 985                 990

Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Tyr Asp Ser  Ile Gln Leu
        995                 1000                1005

Val Asn  Leu Ile Ser Asn Ala  Val Asn Asp Thr Ile  Asn Val Leu
    1010                1015                1020

Pro Thr  Ile Thr Glu Gly Ile  Pro Ile Val Ser Thr  Ile Leu Asp
    1025                1030                1035

Gly Ile  Asn Leu Gly Ala Ala  Ile Lys Glu Leu Leu  Asp Glu His
    1040                1045                1050
```

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```
Asp Pro  Leu Leu Lys Lys Glu  Leu Glu Ala Lys Val  Gly Val Leu
    1055                1060                1065

Ala Ile  Asn Met Ser Leu Ser  Ile Ala Ala Thr Val  Ala Ser Ile
    1070                1075                1080

Val Gly  Ile Gly Ala Glu Val  Thr Ile Phe Leu Leu  Pro Ile Ala
    1085                1090                1095

Gly Ile  Ser Ala Gly Ile Pro  Ser Leu Val Asn Asn  Glu Leu Ile
    1100                1105                1110

Leu His  Asp Lys Ala Thr Ser  Val Val Asn Tyr Phe  Asn His Leu
    1115                1120                1125

Ser Glu  Ser Lys Lys Tyr Gly  Pro Leu Lys Thr Glu  Asp Asp Lys
    1130                1135                1140

Ile Leu  Val Pro Ile Asp Asp  Leu Val Ile Ser Glu  Ile Asp Phe
    1145                1150                1155

Asn Asn  Asn Ser Ile Lys Leu  Gly Thr Cys Asn Ile  Leu Ala Met
    1160                1165                1170

Glu Gly  Gly Ser Gly His Thr  Val Thr Gly Asn Ile  Asp His Phe
    1175                1180                1185

Phe Ser  Ser Pro Ser Ile Ser  Ser His Ile Pro Ser  Leu Ser Ile
    1190                1195                1200

Tyr Ser  Ala Ile Gly Ile Glu  Thr Glu Asn Leu Asp  Phe Ser Lys
    1205                1210                1215

Lys Ile  Met Met Leu Pro Asn  Ala Pro Ser Arg Val  Phe Trp Trp
    1220                1225                1230

Glu Thr  Gly Ala Val Pro Gly  Leu Arg Ser Leu Glu  Asn Asp Gly
    1235                1240                1245
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```
Thr Arg  Leu Leu Asp Ser Ile  Arg Asp Leu Tyr Pro  Gly Lys Phe
    1250                1255                1260

Tyr Trp  Arg Phe Tyr Ala Phe  Phe Asp Tyr Ala Ile  Thr Thr Leu
    1265                1270                1275

Lys Pro  Val Tyr Glu Asp Thr  Asn Ile Lys Ile Lys  Leu Asp Lys
    1280                1285                1290

Asp Thr  Arg Asn Phe Ile Met  Pro Thr Ile Thr Thr  Asn Glu Ile
    1295                1300                1305

Arg Asn  Lys Leu Ser Tyr Ser  Phe Asp Gly Ala Gly  Gly Thr Tyr
    1310                1315                1320

Ser Leu  Leu Leu Ser Ser Tyr  Pro Ile Ser Thr Asn  Ile Asn Leu
    1325                1330                1335

Ser Lys  Asp Asp Leu Trp Ile  Phe Asn Ile Asp Asn  Glu Val Arg
    1340                1345                1350

Glu Ile  Ser Ile Glu Asn Gly  Thr Ile Lys Lys Gly  Lys Leu Ile
    1355                1360                1365

Lys Asp  Val Leu Ser Lys Ile  Asp Ile Asn Lys Asn  Lys Leu Ile
    1370                1375                1380

Ile Gly  Asn Gln Thr Ile Asp  Phe Ser Gly Asp Ile  Asp Asn Lys
    1385                1390                1395

Asp Arg  Tyr Ile Phe Leu Thr  Cys Glu Leu Asp Asp  Lys Ile Ser
    1400                1405                1410

Leu Ile  Ile Glu Ile Asn Leu  Val Ala Lys Ser Tyr  Ser Leu Leu
    1415                1420                1425

Leu Ser  Gly Asp Lys Asn Tyr  Leu Ile Ser Asn Leu  Ser Asn Thr
    1430                1435                1440
```

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```
Ile Glu  Lys Ile Asn Thr Leu  Gly Leu Asp Ser Lys  Asn Ile Ala
    1445                1450                1455

Tyr Asn  Tyr Thr Asp Glu Ser  Asn Asn Lys Tyr Phe  Gly Ala Ile
    1460                1465                1470

Ser Lys  Thr Ser Gln Lys Ser  Ile Ile His Tyr Lys  Lys Asp Ser
    1475                1480                1485

Lys Asn  Ile Leu Glu Phe Tyr  Asn Asp Ser Thr Leu  Glu Phe Asn
    1490                1495                1500

Ser Lys  Asp Phe Ile Ala Glu  Asp Ile Asn Val Phe  Met Lys Asp
    1505                1510                1515

Asp Val  Asn Thr Ile Thr Gly  Lys Tyr Tyr Val Asp  Asn Asn Thr
    1520                1525                1530

Asp Lys  Ser Ile Asp Phe Ser  Ile Ser Leu Val Ser  Lys Asn Gln
    1535                1540                1545

Val Lys  Val Asn Gly Leu Tyr  Leu Asn Glu Ser Val  Tyr Ser Ser
    1550                1555                1560

Tyr Leu  Asp Phe Val Lys Asn  Ser Asp Gly His His  Asn Thr Ser
    1565                1570                1575

Asn Phe  Met Asn Leu Phe Leu  Asp Asn Ile Ser Phe  Trp Lys Leu
    1580                1585                1590

Phe Gly  Phe Glu Asn Ile Asn  Phe Val Ile Asp Lys  Tyr Phe Thr
    1595                1600                1605

Leu Val  Gly Lys Thr Asn Leu  Gly Tyr Val Glu Phe  Ile Cys Asp
    1610                1615                1620

Asn Asn  Lys Asn Ile Asp Ile  Tyr Phe Gly Glu Trp  Lys Thr Ser
    1625                1630                1635
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```
Ser Ser  Lys Ser Thr Ile Phe  Ser Gly Asn Gly Arg  Asn Val Val
    1640                1645                1650

Val Glu  Pro Ile Tyr Asn Pro  Asp Thr Gly Glu Asp  Ile Ser Thr
    1655                1660                1665

Ser Leu  Asp Phe Ser Tyr Glu  Pro Leu Tyr Gly Ile  Asp Arg Tyr
    1670                1675                1680

Ile Asn  Lys Val Leu Ile Ala  Pro Asp Leu Tyr Thr  Ser Leu Ile
    1685                1690                1695

Asn Ile  Asn Thr Asn Tyr Tyr  Ser Asn Glu Tyr Tyr  Pro Glu Ile
    1700                1705                1710

Ile Val  Leu Asn Pro Asn Thr  Phe His Lys Lys Val  Asn Ile Asn
    1715                1720                1725

Leu Asp  Ser Ser Ser Phe Glu  Tyr Lys Trp Ser Thr  Glu Gly Ser
    1730                1735                1740

Asp Phe  Ile Leu Val Arg Tyr  Leu Glu Glu Ser Asn  Lys Lys Ile
    1745                1750                1755

Leu Gln  Lys Ile Arg Ile Lys  Gly Ile Leu Ser Asn  Thr Gln Ser
    1760                1765                1770

Phe Asn  Lys Met Ser Ile Asp  Phe Lys Asp Ile Lys  Lys Leu Ser
    1775                1780                1785

Leu Gly  Tyr Ile Met Ser Asn  Phe Lys Ser Phe Asn  Ser Glu Asn
    1790                1795                1800

Glu Leu  Asp Arg Asp His Leu  Gly Phe Lys Ile Ile  Asp Asn Lys
    1805                1810                1815

Thr Tyr  Tyr Tyr Asp Glu Asp  Ser Lys Leu Val Lys  Gly Leu Ile
    1820                1825                1830
```

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Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

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Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

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Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
2330 2335 2340

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2405 2410 2415

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Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

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Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

<210> 684
<211> 2709
<212> PRT
<213> Artificial Sequence

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<400> 684

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser

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```
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
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260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Ala Val Ala Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile

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465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
    530                 535                 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545                 550                 555                 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
        595                 600                 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
    610                 615                 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625                 630                 635                 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
                645                 650                 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
            660                 665                 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
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675 680 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
690 695 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705 710 715 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
725 730 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
740 745 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
755 760 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
770 775 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785 790 795 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
805 810 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
820 825 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
835 840 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
850 855 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865 870 875 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr

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885 890 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
900 905 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
915 920 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
930 935 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945 950 955 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
965 970 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
980 985 990

Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln Leu
995 1000 1005

Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val Leu
1010 1015 1020

Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu Asp
1025 1030 1035

Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu His
1040 1045 1050

Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val Leu
1055 1060 1065

Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser Ile
1070 1075 1080

Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile Ala

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1085 1090 1095

Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile
1100 1105 1110

Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu
1115 1120 1125

Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys
1130 1135 1140

Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly
1235 1240 1245

Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys

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1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile
1355 1360 1365

Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser

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1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr

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1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn

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1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser

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2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn

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2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
2330 2335 2340

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr

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2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn

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2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

<210> 685
<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 685

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

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His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300
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Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510
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```
Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
    530                 535                 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545                 550                 555                 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
        595                 600                 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
    610                 615                 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625                 630                 635                 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
                645                 650                 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
            660                 665                 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
        675                 680                 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
    690                 695                 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705                 710                 715                 720
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```
Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
                725                 730                 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
            740                 745                 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
        755                 760                 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
    770                 775                 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785                 790                 795                 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
                805                 810                 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
            820                 825                 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
        835                 840                 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
    850                 855                 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865                 870                 875                 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
                885                 890                 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
            900                 905                 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
        915                 920                 925
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```
Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
    930                 935                 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945                 950                 955                 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
                965                 970                 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
            980                 985                 990

Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Tyr Asp Ser  Ile Gln Leu
        995                 1000                1005

Val Asn  Leu Ile Ser Asn Ala  Val Asn Asp Thr Ile  Asn Val Leu
    1010                1015                1020

Pro Thr  Ile Thr Glu Gly Ile  Pro Ile Val Ser Thr  Ile Leu Asp
    1025                1030                1035

Gly Ile  Asn Leu Gly Ala Ala  Ile Lys Glu Leu Leu  Asp Glu His
    1040                1045                1050

Asp Pro  Leu Leu Lys Lys Glu  Leu Glu Ala Lys Val  Gly Val Leu
    1055                1060                1065

Ala Ile  Asn Met Ser Leu Ser  Ile Ala Ala Thr Val  Ala Ser Ile
    1070                1075                1080

Val Gly  Ile Gly Ala Glu Val  Thr Ile Phe Leu Leu  Pro Ile Ala
    1085                1090                1095

Gly Ile  Ser Ala Gly Ile Pro  Ser Leu Val Asn Asn  Glu Leu Ile
    1100                1105                1110

Leu His  Asp Lys Ala Thr Ser  Val Val Asn Tyr Phe  Asn His Leu
    1115                1120                1125
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Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys
1130 1135 1140

Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly
1235 1240 1245

Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

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```
Ser Leu  Leu Leu Ser Ser Tyr  Pro Ile Ser Thr Asn  Ile Asn Leu
    1325                1330                1335

Ser Lys  Asp Asp Leu Trp Ile  Phe Asn Ile Asp Asn  Glu Val Arg
    1340                1345                1350

Glu Ile  Ser Ile Glu Asn Gly  Thr Ile Lys Lys Gly  Lys Leu Ile
    1355                1360                1365

Lys Asp  Val Leu Ser Lys Ile  Asp Ile Asn Lys Asn  Lys Leu Ile
    1370                1375                1380

Ile Gly  Asn Gln Thr Ile Asp  Phe Ser Gly Asp Ile  Asp Asn Lys
    1385                1390                1395

Asp Arg  Tyr Ile Phe Leu Thr  Cys Glu Leu Asp Asp  Lys Ile Ser
    1400                1405                1410

Leu Ile  Ile Glu Ile Asn Leu  Val Ala Lys Ser Tyr  Ser Leu Leu
    1415                1420                1425

Leu Ser  Gly Asp Lys Asn Tyr  Leu Ile Ser Asn Leu  Ser Asn Thr
    1430                1435                1440

Ile Glu  Lys Ile Asn Thr Leu  Gly Leu Asp Ser Lys  Asn Ile Ala
    1445                1450                1455

Tyr Asn  Tyr Thr Asp Glu Ser  Asn Asn Lys Tyr Phe  Gly Ala Ile
    1460                1465                1470

Ser Lys  Thr Ser Gln Lys Ser  Ile Ile His Tyr Lys  Lys Asp Ser
    1475                1480                1485

Lys Asn  Ile Leu Glu Phe Tyr  Asn Asp Ser Thr Leu  Glu Phe Asn
    1490                1495                1500

Ser Lys  Asp Phe Ile Ala Glu  Asp Ile Asn Val Phe  Met Lys Asp
    1505                1510                1515
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Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

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Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

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Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

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Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

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Gln Ala  Ile Val Tyr Gln Asn  Lys Phe Leu Thr Leu  Asn Gly Lys
    2300                2305                2310

Lys Tyr  Tyr Phe Asp Asn Asp  Ser Lys Ala Val Thr  Gly Trp Gln
    2315                2320                2325

Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn Leu Asn  Thr Ala Glu
    2330                2335                2340

Ala Ala  Thr Gly Trp Gln Thr  Ile Asp Gly Lys Lys  Tyr Tyr Phe
    2345                2350                2355

Asn Leu  Asn Thr Ala Glu Ala  Ala Thr Gly Trp Gln  Thr Ile Asp
    2360                2365                2370

Gly Lys  Lys Tyr Tyr Phe Asn  Thr Asn Thr Phe Ile  Ala Ser Thr
    2375                2380                2385

Gly Tyr  Thr Ser Ile Asn Gly  Lys His Phe Tyr Phe  Asn Thr Asp
    2390                2395                2400

Gly Ile  Met Gln Ile Gly Val  Phe Lys Gly Pro Asn  Gly Phe Glu
    2405                2410                2415

Tyr Phe  Ala Pro Ala Asn Thr  His Asn Asn Asn Ile  Glu Gly Gln
    2420                2425                2430

Ala Ile  Leu Tyr Gln Asn Lys  Phe Leu Thr Leu Asn  Gly Lys Lys
    2435                2440                2445

Tyr Tyr  Phe Gly Ser Asp Ser  Lys Ala Val Thr Gly  Leu Arg Thr
    2450                2455                2460

Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr Asn Thr  Ala Val Ala
    2465                2470                2475

Val Thr  Gly Trp Gln Thr Ile  Asn Gly Lys Lys Tyr  Tyr Phe Asn
    2480                2485                2490
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Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

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Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

<210> 686
<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 686

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val

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    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Pro Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
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340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
530 535 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu

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545                 550                 555                 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
        595                 600                 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
    610                 615                 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625                 630                 635                 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
                645                 650                 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
            660                 665                 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
        675                 680                 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
    690                 695                 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705                 710                 715                 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser Ile
                725                 730                 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
            740                 745                 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
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        755                 760                 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
    770                 775                 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785                 790                 795                 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
                805                 810                 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
            820                 825                 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
        835                 840                 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
    850                 855                 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865                 870                 875                 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
                885                 890                 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
            900                 905                 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
        915                 920                 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
    930                 935                 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945                 950                 955                 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
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                965                 970                 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
            980                 985                 990

Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Tyr Asp Ser  Ile Gln Leu
        995                 1000                1005

Val Asn  Leu Ile Ser Asn Ala  Val Asn Asp Thr Ile  Asn Val Leu
    1010                1015                1020

Pro Thr  Ile Thr Glu Gly Ile  Pro Ile Val Ser Thr  Ile Leu Asp
    1025                1030                1035

Gly Ile  Asn Leu Gly Ala Ala  Ile Lys Glu Leu Leu  Asp Glu His
    1040                1045                1050

Asp Pro  Leu Leu Lys Lys Glu  Leu Glu Ala Lys Val  Gly Val Leu
    1055                1060                1065

Ala Ile  Asn Met Ser Leu Ser  Ile Ala Ala Thr Val  Ala Ser Ile
    1070                1075                1080

Val Gly  Ile Gly Ala Glu Val  Thr Ile Phe Leu Leu  Pro Ile Ala
    1085                1090                1095

Gly Ile  Ser Ala Gly Ile Pro  Ser Leu Val Asn Asn  Glu Leu Ile
    1100                1105                1110

Leu His  Asp Lys Ala Thr Ser  Val Val Asn Tyr Phe  Asn His Leu
    1115                1120                1125

Ser Glu  Ser Lys Glu Tyr Gly  Pro Leu Lys Thr Glu  Asp Asp Lys
    1130                1135                1140

Ile Leu  Val Pro Ile Asp Asp  Leu Val Ile Ser Glu  Ile Asp Phe
    1145                1150                1155

Asn Asn  Asn Ser Ile Lys Leu  Gly Thr Cys Asn Ile  Leu Ala Met
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1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Tyr Ile Ser Ser His Ile Pro Ser Leu Ser Val
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Lys Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asn Gly
1235 1240 1245

Thr Lys Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Thr Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asp Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Met Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Asn Leu Ile

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1355 1360 1365

Glu Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Gly Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser

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1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asn Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile

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1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Ser Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Ser Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asn Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr

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1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys

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2135 2140 2145

Tyr Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Val Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr His
2165 2170 2175

Asn Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Lys Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Ile Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Thr His Leu Cys Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Ser Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Val

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2330 2335 2340

Ala Val Thr Gly Trp Gln Thr Ile Asp Gly Glu Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Arg Tyr Tyr Phe Asn Thr Asn Thr Tyr Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Tyr Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr

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2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asp Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Ala Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Ser Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

<210> 687

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<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 687

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Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
            20                  25                  30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175
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```
Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380
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```
Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
    530                 535                 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545                 550                 555                 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590
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Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
595 600 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
610 615 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625 630 635 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
645 650 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
660 665 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
675 680 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
690 695 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705 710 715 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
725 730 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
740 745 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
755 760 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
770 775 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785 790 795 800

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```
Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
                805                 810                 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
            820                 825                 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
        835                 840                 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
    850                 855                 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865                 870                 875                 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
                885                 890                 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
            900                 905                 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
        915                 920                 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
    930                 935                 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945                 950                 955                 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
                965                 970                 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
            980                 985                 990

Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Tyr Asp Ser  Ile Gln Leu
        995                 1000                1005
```

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Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val Leu
1010 1015 1020

Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu Asp
1025 1030 1035

Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu His
1040 1045 1050

Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val Leu
1055 1060 1065

Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser Ile
1070 1075 1080

Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile Ala
1085 1090 1095

Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile
1100 1105 1110

Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu
1115 1120 1125

Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys
1130 1135 1140

Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
1190 1195 1200

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Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly
1235 1240 1245

Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile
1355 1360 1365

Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

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Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

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Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

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Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

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Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

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Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
2330 2335 2340

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

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Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

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Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

<210> 688
<211> 2709
<212> PRT
<213> Artificial Sequence

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<223> Synthetic amino acid sequence

<400> 688

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg

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Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
            20                  25                  30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
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210 215 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225 230 235 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Ala Val Ala Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser

420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
530 535 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545 550 555 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
565 570 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
580 585 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
595 600 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
610 615 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg

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625 630 635 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
645 650 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
660 665 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
675 680 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
690 695 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705 710 715 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
725 730 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
740 745 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
755 760 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
770 775 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785 790 795 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
805 810 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
820 825 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile

835 840 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
850 855 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865 870 875 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
885 890 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
900 905 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
915 920 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
930 935 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945 950 955 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
965 970 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
980 985 990

Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln Leu
995 1000 1005

Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val Leu
1010 1015 1020

Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu Asp
1025 1030 1035

Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu His

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1040 1045 1050

Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val Leu
1055 1060 1065

Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser Ile
1070 1075 1080

Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile Ala
1085 1090 1095

Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile
1100 1105 1110

Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu
1115 1120 1125

Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys
1130 1135 1140

Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly

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1235 1240 1245

Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile
1355 1360 1365

Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr

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1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser

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1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile

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1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val

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2015 2020 2025

Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe

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2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
2330 2335 2340

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu

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2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly

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2600 2605 2610

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

<210> 689
<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 689

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

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Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255
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Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460
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Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
530 535 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545 550 555 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
565 570 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
580 585 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
595 600 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
610 615 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625 630 635 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
645 650 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
660 665 670

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Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
675 680 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
690 695 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705 710 715 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
725 730 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
740 745 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
755 760 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
770 775 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785 790 795 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
805 810 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
820 825 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
835 840 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
850 855 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865 870 875 880

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Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
                885                 890                 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
            900                 905                 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
        915                 920                 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
    930                 935                 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945                 950                 955                 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
                965                 970                 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
            980                 985                 990

Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Tyr Asp Ser  Ile Gln Leu
        995                 1000                1005

Val Asn  Leu Ile Ser Asn Ala  Val Asn Asp Thr Ile  Asn Val Leu
    1010                1015                1020

Pro Thr  Ile Thr Glu Gly Ile  Pro Ile Val Ser Thr  Ile Leu Asp
    1025                1030                1035

Gly Ile  Asn Leu Gly Ala Ala  Ile Lys Glu Leu Leu  Asp Glu His
    1040                1045                1050

Asp Pro  Leu Leu Lys Lys Glu  Leu Glu Ala Lys Val  Gly Val Leu
    1055                1060                1065

Ala Ile  Asn Met Ser Leu Ser  Ile Ala Ala Thr Val  Ala Ser Ile
    1070                1075                1080
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Val Gly  Ile Gly Ala Glu Val  Thr Ile Phe Leu Leu  Pro Ile Ala
    1085                1090                1095

Gly Ile  Ser Ala Gly Ile Pro  Ser Leu Val Asn Asn  Glu Leu Ile
    1100                1105                1110

Leu His  Asp Lys Ala Thr Ser  Val Val Asn Tyr Phe  Asn His Leu
    1115                1120                1125

Ser Glu  Ser Lys Lys Tyr Gly  Pro Leu Lys Thr Glu  Asp Asp Lys
    1130                1135                1140

Ile Leu  Val Pro Ile Asp Asp  Leu Val Ile Ser Glu  Ile Asp Phe
    1145                1150                1155

Asn Asn  Asn Ser Ile Lys Leu  Gly Thr Cys Asn Ile  Leu Ala Met
    1160                1165                1170

Glu Gly  Gly Ser Gly His Thr  Val Thr Gly Asn Ile  Asp His Phe
    1175                1180                1185

Phe Ser  Ser Pro Ser Ile Ser  Ser His Ile Pro Ser  Leu Ser Ile
    1190                1195                1200

Tyr Ser  Ala Ile Gly Ile Glu  Thr Glu Asn Leu Asp  Phe Ser Lys
    1205                1210                1215

Lys Ile  Met Met Leu Pro Asn  Ala Pro Ser Arg Val  Phe Trp Trp
    1220                1225                1230

Glu Thr  Gly Ala Val Pro Gly  Leu Arg Ser Leu Glu  Asn Asp Gly
    1235                1240                1245

Thr Arg  Leu Leu Asp Ser Ile  Arg Asp Leu Tyr Pro  Gly Lys Phe
    1250                1255                1260

Tyr Trp  Arg Phe Tyr Ala Phe  Phe Asp Tyr Ala Ile  Thr Thr Leu
    1265                1270                1275
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Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile
1355 1360 1365

Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

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Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

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Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

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Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

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```
Phe Leu  Thr Leu Asn Gly Lys  Lys Tyr Tyr Phe Asp  Asp Asn Ser
    2060                2065                2070

Lys Ala  Val Thr Gly Trp Gln  Thr Ile Asp Ser Lys  Lys Tyr Tyr
    2075                2080                2085

Phe Asn  Thr Asn Thr Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile
    2090                2095                2100

Asp Gly  Lys Lys Tyr Tyr Phe  Asn Thr Asn Thr Ala  Glu Ala Ala
    2105                2110                2115

Thr Gly  Trp Gln Thr Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr
    2120                2125                2130

Asn Thr  Ala Ile Ala Ser Thr  Gly Tyr Thr Ile Ile  Asn Gly Lys
    2135                2140                2145

His Phe  Tyr Phe Asn Thr Asp  Gly Ile Met Gln Ile  Gly Val Phe
    2150                2155                2160

Lys Gly  Pro Asn Gly Phe Glu  Tyr Phe Ala Pro Ala  Asn Thr Asp
    2165                2170                2175

Ala Asn  Asn Ile Glu Gly Gln  Ala Ile Leu Tyr Gln  Asn Glu Phe
    2180                2185                2190

Leu Thr  Leu Asn Gly Lys Lys  Tyr Tyr Phe Gly Ser  Asp Ser Lys
    2195                2200                2205

Ala Val  Thr Gly Trp Arg Ile  Ile Asn Asn Lys Lys  Tyr Tyr Phe
    2210                2215                2220

Asn Pro  Asn Asn Ala Ile Ala  Ala Ile His Leu Cys  Thr Ile Asn
    2225                2230                2235

Asn Asp  Lys Tyr Tyr Phe Ser  Tyr Asp Gly Ile Leu  Gln Asn Gly
    2240                2245                2250
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Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr Tyr Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
2330 2335 2340

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

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Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

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Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

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<211> 2709
<212> PRT
<213> Artificial Sequence

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<400> 690

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Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu

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                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Gly
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
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290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln

500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
530 535 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545 550 555 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
565 570 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
580 585 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
595 600 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
610 615 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625 630 635 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
645 650 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
660 665 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
675 680 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
690 695 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile

705 710 715 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
725 730 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
740 745 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
755 760 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
770 775 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785 790 795 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
805 810 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
820 825 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
835 840 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
850 855 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865 870 875 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
885 890 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
900 905 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys

915 920 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
930 935 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945 950 955 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
965 970 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
980 985 990

Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln Leu
995 1000 1005

Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val Leu
1010 1015 1020

Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu Asp
1025 1030 1035

Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu His
1040 1045 1050

Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val Leu
1055 1060 1065

Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser Ile
1070 1075 1080

Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile Ala
1085 1090 1095

Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile
1100 1105 1110

Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu

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1115 1120 1125

Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys
1130 1135 1140

Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly
1235 1240 1245

Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr

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1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile
1355 1360 1365

Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Ile
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp

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1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile

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1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Ile Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn

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1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile

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2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly

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2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
2330 2335 2340

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn

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2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe

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2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

<210> 691
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<213> Artificial Sequence

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<223> Synthetic amino acid sequence

<400> 691

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

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Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335
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Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
    530                 535                 540
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Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545                 550                 555                 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
        595                 600                 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
    610                 615                 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625                 630                 635                 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
                645                 650                 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
            660                 665                 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
        675                 680                 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
    690                 695                 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705                 710                 715                 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
                725                 730                 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
            740                 745                 750
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Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
        755                 760                 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
    770                 775                 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785                 790                 795                 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
                805                 810                 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
            820                 825                 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
        835                 840                 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
    850                 855                 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865                 870                 875                 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
                885                 890                 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
            900                 905                 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
        915                 920                 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
    930                 935                 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945                 950                 955                 960
```

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```
Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
                965                 970                 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
            980                 985                 990

Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Tyr Asp Ser  Ile Gln Leu
        995                 1000                1005

Val Asn  Leu Ile Ser Asn Ala  Val Asn Asp Thr Ile  Asn Val Leu
    1010                1015                1020

Pro Thr  Ile Thr Glu Gly Ile  Pro Ile Val Ser Thr  Ile Leu Asp
    1025                1030                1035

Gly Ile  Asn Leu Gly Ala Ala  Ile Lys Glu Leu Leu  Asp Glu His
    1040                1045                1050

Asp Pro  Leu Leu Lys Lys Glu  Leu Glu Ala Lys Val  Gly Val Leu
    1055                1060                1065

Ala Ile  Asn Met Ser Leu Ser  Ile Ala Ala Thr Val  Ala Ser Ile
    1070                1075                1080

Val Gly  Ile Gly Ala Glu Val  Thr Ile Phe Leu Leu  Pro Ile Ala
    1085                1090                1095

Gly Ile  Ser Ala Gly Ile Pro  Ser Leu Val Asn Asn  Glu Leu Ile
    1100                1105                1110

Leu His  Asp Lys Ala Thr Ser  Val Val Asn Tyr Phe  Asn His Leu
    1115                1120                1125

Ser Glu  Ser Lys Lys Tyr Gly  Pro Leu Lys Thr Glu  Asp Asp Lys
    1130                1135                1140

Ile Leu  Val Pro Ile Asp Asp  Leu Val Ile Ser Glu  Ile Asp Phe
    1145                1150                1155
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```
Asn Asn  Asn Ser Ile Lys Leu  Gly Thr Cys Asn Ile  Leu Ala Met
    1160                1165                1170

Glu Gly  Gly Ser Gly His Thr  Val Thr Gly Asn Ile  Asp His Phe
    1175                1180                1185

Phe Ser  Ser Pro Ser Ile Ser  Ser His Ile Pro Ser  Leu Ser Ile
    1190                1195                1200

Tyr Ser  Ala Ile Gly Ile Glu  Thr Glu Asn Leu Asp  Phe Ser Lys
    1205                1210                1215

Lys Ile  Met Met Leu Pro Asn  Ala Pro Ser Arg Val  Phe Trp Trp
    1220                1225                1230

Glu Thr  Gly Ala Val Pro Gly  Leu Arg Ser Leu Glu  Asn Asp Gly
    1235                1240                1245

Thr Arg  Leu Leu Asp Ser Ile  Arg Asp Leu Tyr Pro  Gly Lys Phe
    1250                1255                1260

Tyr Trp  Arg Phe Tyr Ala Phe  Phe Asp Tyr Ala Ile  Thr Thr Leu
    1265                1270                1275

Lys Pro  Val Tyr Glu Asp Thr  Asn Ile Lys Ile Lys  Leu Asp Lys
    1280                1285                1290

Asp Thr  Arg Asn Phe Ile Met  Pro Thr Ile Thr Thr  Asn Glu Ile
    1295                1300                1305

Arg Asn  Lys Leu Ser Tyr Ser  Phe Asp Gly Ala Gly  Gly Thr Tyr
    1310                1315                1320

Ser Leu  Leu Leu Ser Ser Tyr  Pro Ile Ser Thr Asn  Ile Asn Leu
    1325                1330                1335

Ser Lys  Asp Asp Leu Trp Ile  Phe Asn Ile Asp Asn  Glu Val Arg
    1340                1345                1350
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```
Glu Ile  Ser Ile Glu Asn Gly  Thr Ile Lys Lys Gly  Lys Leu Ile
    1355                1360                1365

Lys Asp  Val Leu Ser Lys Ile  Asp Ile Asn Lys Asn  Lys Leu Ile
    1370                1375                1380

Ile Gly  Asn Gln Thr Ile Asp  Phe Ser Gly Asp Ile  Asp Asn Lys
    1385                1390                1395

Asp Arg  Tyr Ile Phe Leu Thr  Cys Glu Leu Asp Asp  Lys Ile Ser
    1400                1405                1410

Leu Ile  Ile Glu Ile Asn Leu  Val Ala Lys Ser Tyr  Ser Leu Leu
    1415                1420                1425

Leu Ser  Gly Asp Lys Asn Tyr  Leu Ile Ser Asn Leu  Ser Asn Thr
    1430                1435                1440

Ile Glu  Lys Ile Asn Thr Leu  Gly Leu Asp Ser Lys  Asn Ile Ala
    1445                1450                1455

Tyr Asn  Tyr Thr Asp Glu Ser  Asn Asn Lys Tyr Phe  Gly Ala Ile
    1460                1465                1470

Ser Lys  Thr Ser Gln Lys Ser  Ile Ile His Tyr Lys  Lys Asp Ser
    1475                1480                1485

Lys Asn  Ile Leu Glu Phe Tyr  Asn Asp Ser Thr Leu  Glu Phe Asn
    1490                1495                1500

Ser Lys  Asp Phe Ile Ala Glu  Asp Ile Asn Val Phe  Met Lys Asp
    1505                1510                1515

Asp Ile  Asn Thr Ile Thr Gly  Lys Tyr Tyr Val Asp  Asn Asn Thr
    1520                1525                1530

Asp Lys  Ser Ile Asp Phe Ser  Ile Ser Leu Val Ser  Lys Asn Gln
    1535                1540                1545
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Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

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```
Asp Phe  Ile Leu Val Arg Tyr  Leu Glu Glu Ser Asn  Lys Lys Ile
    1745                1750                1755

Leu Gln  Lys Ile Arg Ile Lys  Gly Ile Leu Ser Asn  Thr Gln Ser
    1760                1765                1770

Phe Asn  Lys Met Ser Ile Asp  Phe Lys Asp Ile Lys  Lys Leu Ser
    1775                1780                1785

Leu Gly  Tyr Ile Met Ser Asn  Phe Lys Ser Phe Asn  Ser Glu Asn
    1790                1795                1800

Glu Leu  Asp Arg Asp His Leu  Gly Phe Lys Ile Ile  Asp Asn Lys
    1805                1810                1815

Thr Tyr  Tyr Tyr Asp Glu Asp  Ser Lys Leu Val Lys  Gly Leu Ile
    1820                1825                1830

Asn Ile  Asn Asn Ser Leu Phe  Tyr Phe Asp Pro Ile  Glu Phe Asn
    1835                1840                1845

Leu Val  Thr Gly Trp Gln Thr  Ile Asn Gly Lys Lys  Tyr Tyr Phe
    1850                1855                1860

Asp Ile  Asn Thr Gly Ala Ala  Leu Thr Ser Tyr Lys  Ile Ile Asn
    1865                1870                1875

Gly Lys  His Phe Tyr Phe Asn  Asn Asp Gly Val Met  Gln Leu Gly
    1880                1885                1890

Val Phe  Lys Gly Pro Asp Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    1895                1900                1905

Thr Gln  Asn Asn Asn Ile Glu  Gly Gln Ala Ile Val  Tyr Gln Ser
    1910                1915                1920

Lys Phe  Leu Thr Leu Asn Gly  Lys Lys Tyr Tyr Phe  Asp Asn Asp
    1925                1930                1935
```

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Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

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Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

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Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
2330 2335 2340

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

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Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

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<210> 692
<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 692

```
Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1               5                  10                  15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
            20                  25                  30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
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165 170 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
180 185 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
195 200 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
210 215 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225 230 235 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Ala Val Ala Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala

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370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
530 535 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545 550 555 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
565 570 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr

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580 585 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
595 600 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
610 615 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625 630 635 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
645 650 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
660 665 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
675 680 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
690 695 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705 710 715 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
725 730 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
740 745 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
755 760 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
770 775 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser

785 790 795 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
805 810 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
820 825 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
835 840 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
850 855 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865 870 875 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
885 890 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
900 905 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
915 920 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
930 935 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945 950 955 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
965 970 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
980 985 990

Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln Leu

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995 1000 1005

Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val Leu
1010 1015 1020

Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu Asp
1025 1030 1035

Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu His
1040 1045 1050

Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val Leu
1055 1060 1065

Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser Ile
1070 1075 1080

Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile Ala
1085 1090 1095

Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile
1100 1105 1110

Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu
1115 1120 1125

Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys
1130 1135 1140

Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile

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1190 1195 1200

Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly
1235 1240 1245

Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile
1355 1360 1365

Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys

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1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu

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1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser

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1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile

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1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp

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2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
2330 2335 2340

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp

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2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser

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2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

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Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1               5                  10                  15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
            20                  25                  30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205
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```
Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415
```

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```
Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
    530                 535                 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545                 550                 555                 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
        595                 600                 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
    610                 615                 620
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```
Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625                 630                 635                 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
                645                 650                 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
            660                 665                 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
        675                 680                 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
    690                 695                 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705                 710                 715                 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
                725                 730                 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
            740                 745                 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
        755                 760                 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
    770                 775                 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785                 790                 795                 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
                805                 810                 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
            820                 825                 830
```

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```
Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
        835                 840                 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
    850                 855                 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865                 870                 875                 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
                885                 890                 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
            900                 905                 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
        915                 920                 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
    930                 935                 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945                 950                 955                 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
                965                 970                 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
            980                 985                 990

Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Tyr Asp Ser  Ile Gln Leu
        995                 1000                1005

Val Asn  Leu Ile Ser Asn Ala  Val Asn Asp Thr Ile  Asn Val Leu
    1010                1015                1020

Pro Thr  Ile Thr Glu Gly Ile  Pro Ile Val Ser Thr  Ile Leu Asp
    1025                1030                1035
```

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```
Gly Ile  Asn Leu Gly Ala Ala  Ile Lys Glu Leu Leu  Asp Glu His
    1040                1045                1050

Asp Pro  Leu Leu Lys Lys Glu  Leu Glu Ala Lys Val  Gly Val Leu
    1055                1060                1065

Ala Ile  Asn Met Ser Leu Ser  Ile Ala Ala Thr Val  Ala Ser Ile
    1070                1075                1080

Val Gly  Ile Gly Ala Glu Val  Thr Ile Phe Leu Leu  Pro Ile Ala
    1085                1090                1095

Gly Ile  Ser Ala Gly Ile Pro  Ser Leu Val Asn Asn  Glu Leu Ile
    1100                1105                1110

Leu His  Asp Lys Ala Thr Ser  Val Val Asn Tyr Phe  Asn His Leu
    1115                1120                1125

Ser Glu  Ser Lys Lys Tyr Gly  Pro Leu Lys Thr Glu  Asp Asp Lys
    1130                1135                1140

Ile Leu  Val Pro Ile Asp Asp  Leu Val Ile Ser Glu  Ile Asp Phe
    1145                1150                1155

Asn Asn  Asn Ser Ile Lys Leu  Gly Thr Cys Asn Ile  Leu Ala Met
    1160                1165                1170

Glu Gly  Gly Ser Gly His Thr  Val Thr Gly Asn Ile  Asp His Phe
    1175                1180                1185

Phe Ser  Ser Pro Ser Ile Ser  Ser His Ile Pro Ser  Leu Ser Ile
    1190                1195                1200

Tyr Ser  Ala Ile Gly Ile Glu  Thr Glu Asn Leu Asp  Phe Ser Lys
    1205                1210                1215

Lys Ile  Met Met Leu Pro Asn  Ala Pro Ser Arg Val  Phe Trp Trp
    1220                1225                1230
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```
Glu Thr  Gly Ala Val Pro Gly  Leu Arg Ser Leu Glu  Asn Asp Gly
    1235                1240                1245

Thr Arg  Leu Leu Asp Ser Ile  Arg Asp Leu Tyr Pro  Gly Lys Phe
    1250                1255                1260

Tyr Trp  Arg Phe Tyr Ala Phe  Phe Asp Tyr Ala Ile  Thr Thr Leu
    1265                1270                1275

Lys Pro  Val Tyr Glu Asp Thr  Asn Ile Lys Ile Lys  Leu Asp Lys
    1280                1285                1290

Asp Thr  Arg Asn Phe Ile Met  Pro Thr Ile Thr Thr  Asn Glu Ile
    1295                1300                1305

Arg Asn  Lys Leu Ser Tyr Ser  Phe Asp Gly Ala Gly  Gly Thr Tyr
    1310                1315                1320

Ser Leu  Leu Leu Ser Ser Tyr  Pro Ile Ser Thr Asn  Ile Asn Leu
    1325                1330                1335

Ser Lys  Asp Asp Leu Trp Ile  Phe Asn Ile Asp Asn  Glu Val Arg
    1340                1345                1350

Glu Ile  Ser Ile Glu Asn Gly  Thr Ile Lys Lys Gly  Lys Leu Ile
    1355                1360                1365

Lys Asp  Val Leu Ser Lys Ile  Asp Ile Asn Lys Asn  Lys Leu Ile
    1370                1375                1380

Ile Gly  Asn Gln Thr Ile Asp  Phe Ser Gly Asp Ile  Asp Asn Lys
    1385                1390                1395

Asp Arg  Tyr Ile Phe Leu Thr  Cys Glu Leu Asp Asp  Lys Ile Ser
    1400                1405                1410

Leu Ile  Ile Glu Ile Asn Leu  Val Ala Lys Ser Tyr  Ser Leu Leu
    1415                1420                1425
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Leu Ser Gly Asn Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Gly Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

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```
Asn Asn  Lys Asn Ile Asp Ile  Tyr Phe Gly Glu Trp  Lys Thr Ser
    1625                1630                1635

Ser Ser  Lys Ser Thr Ile Phe  Ser Gly Asn Gly Arg  Asn Val Val
    1640                1645                1650

Val Glu  Pro Ile Tyr Asn Pro  Asp Thr Gly Glu Asp  Ile Ser Thr
    1655                1660                1665

Ser Leu  Asp Phe Ser Tyr Glu  Pro Leu Tyr Gly Ile  Asp Arg Tyr
    1670                1675                1680

Ile Asn  Lys Val Leu Ile Ala  Pro Asp Leu Tyr Thr  Ser Leu Ile
    1685                1690                1695

Asn Ile  Asn Thr Asn Tyr Tyr  Ser Asn Glu Tyr Tyr  Pro Glu Ile
    1700                1705                1710

Ile Val  Leu Asn Pro Asn Thr  Phe His Lys Lys Val  Asn Ile Asn
    1715                1720                1725

Leu Asp  Ser Ser Ser Phe Glu  Tyr Lys Trp Ser Thr  Glu Gly Ser
    1730                1735                1740

Asp Phe  Ile Leu Val Arg Tyr  Leu Glu Glu Ser Asn  Lys Lys Ile
    1745                1750                1755

Leu Gln  Lys Ile Arg Ile Lys  Gly Ile Leu Ser Asn  Thr Gln Ser
    1760                1765                1770

Phe Asn  Lys Met Ser Ile Asp  Phe Lys Asp Ile Lys  Lys Leu Ser
    1775                1780                1785

Leu Gly  Tyr Ile Met Ser Asn  Phe Lys Ser Phe Asn  Ser Glu Asn
    1790                1795                1800

Glu Leu  Asp Arg Asp His Leu  Gly Phe Lys Ile Ile  Asp Asn Lys
    1805                1810                1815
```

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Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

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Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asp Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

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Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
2330 2335 2340

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

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```
Gly Ile  Met Gln Ile Gly Val  Phe Lys Gly Pro Asn  Gly Phe Glu
    2405                2410                2415

Tyr Phe  Ala Pro Ala Asn Thr  His Asn Asn Asn Ile  Glu Gly Gln
    2420                2425                2430

Ala Ile  Leu Tyr Gln Asn Lys  Phe Leu Thr Leu Asn  Gly Lys Lys
    2435                2440                2445

Tyr Tyr  Phe Gly Ser Asp Ser  Lys Ala Val Thr Gly  Leu Arg Thr
    2450                2455                2460

Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr Asn Thr  Ala Val Ala
    2465                2470                2475

Val Thr  Gly Trp Gln Thr Ile  Asn Gly Lys Lys Tyr  Tyr Phe Asn
    2480                2485                2490

Thr Asn  Thr Ser Ile Ala Ser  Thr Gly Tyr Thr Ile  Ile Ser Gly
    2495                2500                2505

Lys His  Phe Tyr Phe Asn Thr  Asp Gly Ile Met Gln  Ile Gly Val
    2510                2515                2520

Phe Lys  Gly Pro Asp Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr
    2525                2530                2535

Asp Ala  Asn Asn Ile Glu Gly  Gln Ala Ile Arg Tyr  Gln Asn Arg
    2540                2545                2550

Phe Leu  Tyr Leu His Asp Asn  Ile Tyr Tyr Phe Gly  Asn Asn Ser
    2555                2560                2565

Lys Ala  Ala Thr Gly Trp Val  Thr Ile Asp Gly Asn  Arg Tyr Tyr
    2570                2575                2580

Phe Glu  Pro Asn Thr Ala Met  Gly Ala Asn Gly Tyr  Lys Thr Ile
    2585                2590                2595
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Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

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<223> Synthetic amino acid sequence

<400> 694

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys

```
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
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245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Ala Val Ala Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile

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450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
530 535 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545 550 555 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
565 570 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
580 585 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
595 600 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
610 615 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625 630 635 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
645 650 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu

660 665 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
675 680 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
690 695 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705 710 715 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
725 730 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
740 745 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
755 760 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
770 775 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785 790 795 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
805 810 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
820 825 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
835 840 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
850 855 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp

865 870 875 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
885 890 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
900 905 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
915 920 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
930 935 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945 950 955 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
965 970 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
980 985 990

Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln Leu
995 1000 1005

Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val Leu
1010 1015 1020

Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu Asp
1025 1030 1035

Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu His
1040 1045 1050

Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val Leu
1055 1060 1065

Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser Ile

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1070 1075 1080

Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile Ala
1085 1090 1095

Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile
1100 1105 1110

Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu
1115 1120 1125

Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys
1130 1135 1140

Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly
1235 1240 1245

Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu

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1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile
1355 1360 1365

Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asn Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile

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1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Gly Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr

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1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe

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1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys

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2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asp Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly

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2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
2330 2335 2340

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys

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2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn

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2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

<210> 695
<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 695

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

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```
Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Ala Val Ala Met Leu
        275                 280                 285
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Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495
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```
Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
    530                 535                 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545                 550                 555                 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
        595                 600                 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
    610                 615                 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625                 630                 635                 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
                645                 650                 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
            660                 665                 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
        675                 680                 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
    690                 695                 700
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```
Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705                 710                 715                 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
                725                 730                 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
            740                 745                 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
        755                 760                 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
    770                 775                 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785                 790                 795                 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
                805                 810                 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
            820                 825                 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
        835                 840                 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
    850                 855                 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865                 870                 875                 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
                885                 890                 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
            900                 905                 910
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Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
915 920 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
930 935 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945 950 955 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
965 970 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
980 985 990

Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln Leu
995 1000 1005

Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val Leu
1010 1015 1020

Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu Asp
1025 1030 1035

Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu His
1040 1045 1050

Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val Leu
1055 1060 1065

Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser Ile
1070 1075 1080

Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile Ala
1085 1090 1095

Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile
1100 1105 1110

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Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu
1115 1120 1125

Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys
1130 1135 1140

Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly
1235 1240 1245

Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

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Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile
1355 1360 1365

Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe Asn
1490 1495 1500

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Ser Lys  Asp Phe Ile Ala Glu  Asp Ile Asn Val Phe  Met Lys Asp
    1505                1510                1515

Asp Ile  Asn Thr Ile Thr Gly  Lys Tyr Tyr Val Asp  Asn Asn Thr
    1520                1525                1530

Asp Lys  Ser Ile Asp Phe Ser  Ile Ser Leu Val Ser  Lys Asn Gln
    1535                1540                1545

Val Lys  Val Asn Gly Leu Tyr  Leu Asn Glu Ser Val  Tyr Ser Ser
    1550                1555                1560

Tyr Leu  Asp Phe Val Lys Asn  Ser Asp Gly His His  Asn Thr Ser
    1565                1570                1575

Asn Phe  Met Asn Leu Phe Leu  Asp Asn Ile Ser Phe  Trp Lys Leu
    1580                1585                1590

Phe Gly  Phe Glu Asn Ile Asn  Phe Val Ile Asp Lys  Tyr Phe Thr
    1595                1600                1605

Leu Val  Gly Lys Thr Asn Leu  Gly Tyr Val Glu Phe  Ile Cys Asp
    1610                1615                1620

Asn Asn  Lys Asn Ile Asp Ile  Tyr Phe Gly Glu Trp  Lys Thr Ser
    1625                1630                1635

Ser Ser  Lys Ser Thr Ile Phe  Ser Gly Asn Gly Arg  Asn Val Val
    1640                1645                1650

Val Glu  Pro Ile Tyr Asn Pro  Asp Thr Gly Glu Asp  Ile Ser Thr
    1655                1660                1665

Ser Leu  Asp Phe Ser Tyr Glu  Pro Leu Tyr Gly Ile  Asp Arg Tyr
    1670                1675                1680

Ile Asn  Lys Val Leu Ile Ala  Pro Asp Leu Tyr Thr  Ser Leu Ile
    1685                1690                1695
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Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly
1880 1885 1890

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Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

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Phe Asn  Thr Asn Thr Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile
    2090                2095                2100

Asp Gly  Lys Lys Tyr Tyr Phe  Asn Thr Asn Thr Ala  Glu Ala Ala
    2105                2110                2115

Thr Gly  Trp Gln Thr Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr
    2120                2125                2130

Asn Thr  Ala Ile Ala Ser Thr  Gly Tyr Thr Ile Ile  Asn Gly Lys
    2135                2140                2145

His Phe  Tyr Phe Asn Thr Asp  Gly Ile Met Gln Ile  Gly Val Phe
    2150                2155                2160

Lys Gly  Pro Asn Gly Phe Glu  Tyr Phe Ala Pro Ala  Asn Thr Asp
    2165                2170                2175

Ala Asn  Asn Ile Glu Gly Gln  Ala Ile Leu Tyr Gln  Asn Glu Phe
    2180                2185                2190

Leu Thr  Leu Asn Gly Lys Lys  Tyr Tyr Phe Gly Ser  Asp Ser Lys
    2195                2200                2205

Ala Val  Thr Gly Trp Arg Ile  Ile Asn Asn Lys Lys  Tyr Tyr Phe
    2210                2215                2220

Asn Pro  Asn Asn Ala Ile Ala  Ala Ile His Leu Cys  Thr Ile Asn
    2225                2230                2235

Asn Asp  Lys Tyr Tyr Phe Ser  Tyr Asp Gly Ile Leu  Gln Asn Gly
    2240                2245                2250

Tyr Ile  Thr Ile Glu Arg Asn  Asn Phe Tyr Phe Asp  Ala Asn Asn
    2255                2260                2265

Glu Ser  Lys Met Val Thr Gly  Val Phe Lys Gly Pro  Asn Gly Phe
    2270                2275                2280
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Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
2330 2335 2340

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

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Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

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Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

<210> 696
<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 696

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp

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        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
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325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp

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530 535 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545 550 555 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
565 570 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
580 585 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
595 600 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
610 615 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625 630 635 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
645 650 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
660 665 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
675 680 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
690 695 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705 710 715 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
725 730 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg

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740 745 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
755 760 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
770 775 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785 790 795 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
805 810 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
820 825 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
835 840 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
850 855 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865 870 875 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
885 890 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
900 905 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
915 920 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
930 935 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu

945 950 955 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
965 970 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
980 985 990

Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln Leu
995 1000 1005

Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val Leu
1010 1015 1020

Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu Asp
1025 1030 1035

Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu His
1040 1045 1050

Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val Leu
1055 1060 1065

Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser Ile
1070 1075 1080

Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile Ala
1085 1090 1095

Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile
1100 1105 1110

Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu
1115 1120 1125

Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys
1130 1135 1140

Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe

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1145 1150 1155

Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asn Gly
1235 1240 1245

Thr Lys Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg

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1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile
1355 1360 1365

Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Gly Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln

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1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser

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1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp

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1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asp Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr

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2120 2125 2130

Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr Tyr Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln

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2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
2330 2335 2340

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val

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2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly

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2705

<210> 697
<211> 2709
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<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 697

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Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
            20                  25                  30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160
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```
Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365
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```
Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
    530                 535                 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545                 550                 555                 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575
```

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```
Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
        595                 600                 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
    610                 615                 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625                 630                 635                 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
                645                 650                 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
            660                 665                 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
        675                 680                 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
    690                 695                 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705                 710                 715                 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
                725                 730                 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
            740                 745                 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
        755                 760                 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
    770                 775                 780
```

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```
Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785                 790                 795                 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
                805                 810                 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
            820                 825                 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
        835                 840                 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
    850                 855                 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865                 870                 875                 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
                885                 890                 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
            900                 905                 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
        915                 920                 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
    930                 935                 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945                 950                 955                 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
                965                 970                 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
            980                 985                 990
```

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Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln Leu
995 1000 1005

Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val Leu
1010 1015 1020

Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu Asp
1025 1030 1035

Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu His
1040 1045 1050

Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val Leu
1055 1060 1065

Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser Ile
1070 1075 1080

Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile Ala
1085 1090 1095

Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile
1100 1105 1110

Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu
1115 1120 1125

Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys
1130 1135 1140

Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

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Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly
1235 1240 1245

Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile
1355 1360 1365

Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

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```
Ile Gly  Asn Gln Thr Ile Asp  Phe Ser Gly Asp Ile  Asp Asn Lys
    1385                1390                1395

Asp Arg  Tyr Ile Phe Leu Thr  Cys Glu Leu Asp Asp  Lys Ile Ser
    1400                1405                1410

Leu Ile  Ile Glu Ile Asn Leu  Val Ala Lys Ser Tyr  Ser Leu Leu
    1415                1420                1425

Leu Ser  Gly Asp Lys Asn Tyr  Leu Ile Ser Asn Leu  Ser Asn Thr
    1430                1435                1440

Ile Glu  Lys Ile Asn Thr Leu  Gly Leu Asp Ser Lys  Asn Ile Ala
    1445                1450                1455

Tyr Asn  Tyr Thr Asp Glu Ser  Asn Asn Lys Tyr Phe  Gly Ala Ile
    1460                1465                1470

Ser Lys  Thr Ser Gln Lys Ser  Ile Ile His Tyr Lys  Lys Asp Ser
    1475                1480                1485

Lys Asn  Ile Leu Glu Phe Tyr  Asn Asp Ser Thr Leu  Glu Phe Asn
    1490                1495                1500

Ser Lys  Asp Phe Ile Ala Glu  Asp Ile Asn Val Phe  Met Lys Asp
    1505                1510                1515

Asp Ile  Asn Thr Ile Thr Gly  Lys Tyr Tyr Val Asp  Asn Asn Thr
    1520                1525                1530

Asp Lys  Ser Ile Asp Phe Ser  Ile Ser Leu Val Ser  Lys Asn Gln
    1535                1540                1545

Val Lys  Val Asn Gly Leu Tyr  Leu Asn Glu Ser Val  Tyr Ser Ser
    1550                1555                1560

Tyr Leu  Asp Phe Val Lys Asn  Ser Asp Gly His His  Asn Thr Ser
    1565                1570                1575
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```
Asn Phe  Met Asn Leu Phe Leu  Asp Asn Ile Ser Phe  Trp Lys Leu
    1580                1585                1590

Phe Gly  Phe Glu Asn Ile Asn  Phe Val Ile Asp Lys  Tyr Phe Thr
    1595                1600                1605

Leu Val  Gly Lys Thr Asn Leu  Gly Tyr Val Glu Phe  Ile Cys Asp
    1610                1615                1620

Asn Asn  Lys Asn Ile Asp Ile  Tyr Phe Gly Glu Trp  Lys Thr Ser
    1625                1630                1635

Ser Ser  Lys Ser Thr Ile Phe  Ser Gly Asn Gly Arg  Asn Val Val
    1640                1645                1650

Val Glu  Pro Ile Tyr Asn Pro  Asn Thr Gly Glu Asp  Ile Ser Thr
    1655                1660                1665

Ser Leu  Asp Phe Ser Tyr Glu  Pro Leu Tyr Gly Ile  Asp Arg Tyr
    1670                1675                1680

Ile Asn  Lys Val Leu Ile Ala  Pro Asp Leu Tyr Thr  Ser Leu Ile
    1685                1690                1695

Asn Ile  Asn Thr Asn Tyr Tyr  Ser Asn Glu Tyr Tyr  Pro Glu Ile
    1700                1705                1710

Ile Val  Leu Asn Pro Asn Thr  Phe His Lys Lys Val  Asn Ile Asn
    1715                1720                1725

Leu Asp  Ser Ser Ser Phe Glu  Tyr Lys Trp Ser Thr  Glu Gly Ser
    1730                1735                1740

Asp Phe  Ile Leu Val Arg Tyr  Leu Glu Glu Ser Asn  Lys Lys Ile
    1745                1750                1755

Leu Gln  Lys Ile Arg Ile Lys  Gly Ile Leu Ser Asn  Thr Gln Ser
    1760                1765                1770
```

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Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

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Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

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Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
2330 2335 2340

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

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Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

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Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

<210> 698
<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

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<400> 698

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
130 135 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145 150 155 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
165 170 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
180 185 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu

195 200 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
210 215 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225 230 235 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Ala Val Ala Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile

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405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
530 535 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545 550 555 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
565 570 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
580 585 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
595 600 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp

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610 615 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625 630 635 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
645 650 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
660 665 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
675 680 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
690 695 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705 710 715 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
725 730 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
740 745 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
755 760 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
770 775 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785 790 795 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
805 810 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser

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820 825 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
835 840 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
850 855 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865 870 875 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
885 890 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
900 905 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
915 920 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
930 935 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945 950 955 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
965 970 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
980 985 990

Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln Leu
995 1000 1005

Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val Leu
1010 1015 1020

Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu Asp

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1025 1030 1035

Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu His
1040 1045 1050

Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val Leu
1055 1060 1065

Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser Ile
1070 1075 1080

Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile Ala
1085 1090 1095

Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile
1100 1105 1110

Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu
1115 1120 1125

Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys
1130 1135 1140

Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp

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1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly
1235 1240 1245

Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile
1355 1360 1365

Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu

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1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Val Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp

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1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys

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1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly

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2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys

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2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
2330 2335 2340

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp

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2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile

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2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

<210> 699
<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 699

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

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Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240
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Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445
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Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
    530                 535                 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545                 550                 555                 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
        595                 600                 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
    610                 615                 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625                 630                 635                 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
                645                 650                 655
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Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
            660                 665                 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
        675                 680                 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
    690                 695                 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705                 710                 715                 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
                725                 730                 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
            740                 745                 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
        755                 760                 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
    770                 775                 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785                 790                 795                 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
                805                 810                 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
            820                 825                 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
        835                 840                 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
    850                 855                 860
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Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865                 870                 875                 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
                885                 890                 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
            900                 905                 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
        915                 920                 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
    930                 935                 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945                 950                 955                 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
                965                 970                 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
            980                 985                 990

Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Tyr Asp Ser  Ile Gln Leu
        995                 1000                1005

Val Asn  Leu Ile Ser Asn Ala  Val Asn Asp Thr Ile  Asn Val Leu
    1010                1015                1020

Pro Thr  Ile Thr Glu Gly Ile  Pro Ile Val Ser Thr  Ile Leu Asp
    1025                1030                1035

Gly Ile  Asn Leu Gly Ala Ala  Ile Lys Glu Leu Leu  Asp Glu His
    1040                1045                1050

Asp Pro  Leu Leu Lys Lys Glu  Leu Glu Ala Lys Val  Gly Val Leu
    1055                1060                1065
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Ala Ile  Asn Met Ser Leu Ser  Ile Ala Ala Thr Val  Ala Ser Ile
    1070                1075                1080

Val Gly  Ile Gly Ala Glu Val  Thr Ile Phe Leu Leu  Pro Ile Ala
    1085                1090                1095

Gly Ile  Ser Ala Gly Ile Pro  Ser Leu Val Asn Asn  Glu Leu Ile
    1100                1105                1110

Leu His  Asp Lys Ala Thr Ser  Val Val Asn Tyr Phe  Asn His Leu
    1115                1120                1125

Ser Glu  Ser Lys Lys Tyr Gly  Pro Leu Lys Thr Glu  Asp Asp Lys
    1130                1135                1140

Ile Leu  Val Pro Ile Asp Asp  Leu Val Ile Ser Glu  Ile Asp Phe
    1145                1150                1155

Asn Asn  Asn Ser Ile Lys Leu  Gly Thr Cys Asn Ile  Leu Ala Met
    1160                1165                1170

Glu Gly  Gly Ser Gly His Thr  Val Thr Gly Asn Ile  Asp His Phe
    1175                1180                1185

Phe Ser  Ser Pro Ser Ile Ser  Ser His Ile Pro Ser  Leu Ser Ile
    1190                1195                1200

Tyr Ser  Ala Ile Gly Ile Glu  Thr Glu Asn Leu Asp  Phe Ser Lys
    1205                1210                1215

Lys Ile  Met Met Leu Pro Asn  Ala Pro Ser Arg Val  Phe Trp Trp
    1220                1225                1230

Glu Thr  Gly Ala Val Pro Gly  Leu Arg Ser Leu Glu  Asn Asp Gly
    1235                1240                1245

Thr Arg  Leu Leu Asp Ser Ile  Arg Asp Leu Tyr Pro  Gly Lys Phe
    1250                1255                1260
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Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile
1355 1360 1365

Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asn Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

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```
Tyr Asn  Tyr Thr Asp Glu Ser  Asn Asn Lys Tyr Phe  Gly Ala Ile
    1460                1465                1470

Ser Lys  Thr Ser Gln Lys Ser  Ile Ile His Tyr Lys  Lys Asp Ser
    1475                1480                1485

Lys Asn  Ile Leu Glu Phe Tyr  Asn Asp Ser Thr Leu  Glu Phe Asn
    1490                1495                1500

Ser Lys  Asp Phe Ile Ala Glu  Asp Ile Asn Val Phe  Met Lys Asp
    1505                1510                1515

Asp Ile  Asn Thr Ile Thr Gly  Lys Tyr Tyr Val Asp  Asn Asn Thr
    1520                1525                1530

Asp Lys  Gly Ile Asp Phe Ser  Ile Ser Leu Val Ser  Lys Asn Gln
    1535                1540                1545

Val Lys  Val Asn Gly Leu Tyr  Leu Asn Glu Ser Val  Tyr Ser Ser
    1550                1555                1560

Tyr Leu  Asp Phe Val Lys Asn  Ser Asp Gly His His  Asn Thr Ser
    1565                1570                1575

Asn Phe  Met Asn Leu Phe Leu  Asp Asn Ile Ser Phe  Trp Lys Leu
    1580                1585                1590

Phe Gly  Phe Glu Asn Ile Asn  Phe Val Ile Asp Lys  Tyr Phe Thr
    1595                1600                1605

Leu Val  Gly Lys Thr Asn Leu  Gly Tyr Val Glu Phe  Ile Cys Asp
    1610                1615                1620

Asn Asn  Lys Asn Ile Asp Ile  Tyr Phe Gly Glu Trp  Lys Thr Ser
    1625                1630                1635

Ser Ser  Lys Ser Thr Ile Phe  Ser Gly Asn Gly Arg  Asn Val Val
    1640                1645                1650
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Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn
1835 1840 1845

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Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

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Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn
2225 2230 2235

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Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
2330 2335 2340

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
2420 2425 2430

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Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

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Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

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20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu

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65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
130 135 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145 150 155 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
165 170 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
180 185 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
195 200 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
210 215 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225 230 235 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Ala Val Ala Met Leu

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275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu

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485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
530 535 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545 550 555 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
565 570 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
580 585 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
595 600 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
610 615 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625 630 635 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
645 650 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
660 665 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
675 680 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr

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690 695 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705 710 715 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
725 730 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
740 745 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
755 760 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
770 775 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785 790 795 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
805 810 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
820 825 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
835 840 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
850 855 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865 870 875 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
885 890 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val

900 905 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
915 920 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
930 935 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945 950 955 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
965 970 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
980 985 990

Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln Leu
995 1000 1005

Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val Leu
1010 1015 1020

Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu Asp
1025 1030 1035

Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu His
1040 1045 1050

Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val Leu
1055 1060 1065

Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser Ile
1070 1075 1080

Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile Ala
1085 1090 1095

Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile

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    1100                1105                1110

Leu His  Asp Lys Ala Thr Ser  Val Val Asn Tyr Phe  Asn His Leu
    1115                1120                1125

Ser Glu  Ser Lys Lys Tyr Gly  Pro Leu Lys Thr Glu  Asp Asp Lys
    1130                1135                1140

Ile Leu  Val Pro Ile Asp Asp  Leu Val Ile Ser Glu  Ile Asp Phe
    1145                1150                1155

Asn Asn  Asn Ser Ile Lys Leu  Gly Thr Cys Asn Ile  Leu Ala Met
    1160                1165                1170

Glu Gly  Gly Ser Gly His Thr  Val Thr Gly Asn Ile  Asp His Phe
    1175                1180                1185

Phe Ser  Ser Pro Ser Ile Ser  Ser His Ile Pro Ser  Leu Ser Ile
    1190                1195                1200

Tyr Ser  Ala Ile Gly Ile Glu  Thr Glu Asn Leu Asp  Phe Ser Lys
    1205                1210                1215

Lys Ile  Met Met Leu Pro Asn  Ala Pro Ser Arg Val  Phe Trp Trp
    1220                1225                1230

Glu Thr  Gly Ala Val Pro Gly  Leu Arg Ser Leu Glu  Asn Asp Gly
    1235                1240                1245

Thr Arg  Leu Leu Asp Ser Ile  Arg Asp Leu Tyr Pro  Gly Lys Phe
    1250                1255                1260

Tyr Trp  Arg Phe Tyr Ala Phe  Phe Asp Tyr Ala Ile  Thr Thr Leu
    1265                1270                1275

Lys Pro  Val Tyr Glu Asp Thr  Asn Ile Lys Ile Lys  Leu Asp Lys
    1280                1285                1290

Asp Thr  Arg Asn Phe Ile Met  Pro Thr Ile Thr Thr  Asn Glu Ile
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1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile
1355 1360 1365

Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe Asn

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1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile

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1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly

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1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr

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2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
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Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
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Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
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Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
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Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe
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Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
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Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
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Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe

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2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
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Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
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Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
2330 2335 2340

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

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2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
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Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
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Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
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Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala

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2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr

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2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
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Ala Pro Gly Ile Tyr Gly
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Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

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Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Val Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320
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Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

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Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
    530                 535                 540

Asn Glu Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545                 550                 555                 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
        595                 600                 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
    610                 615                 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625                 630                 635                 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
                645                 650                 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
            660                 665                 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
        675                 680                 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
    690                 695                 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705                 710                 715                 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser Ile
                725                 730                 735
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Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
            740                 745                 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
        755                 760                 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
    770                 775                 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785                 790                 795                 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Thr Ser Val Ser Pro
                805                 810                 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
            820                 825                 830

Val Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
        835                 840                 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
    850                 855                 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865                 870                 875                 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
                885                 890                 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
            900                 905                 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
        915                 920                 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
    930                 935                 940
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Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945                 950                 955                 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
                965                 970                 975

Asp Leu Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
            980                 985                 990

Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Tyr Asp Ser  Ile Gln Leu
        995                 1000                1005

Val Asn  Leu Ile Ser Asn Ala  Val Asn Asp Thr Ile  Asn Val Leu
    1010                1015                1020

Pro Thr  Ile Thr Glu Gly Ile  Pro Ile Val Ser Thr  Ile Leu Asp
    1025                1030                1035

Gly Ile  Asn Leu Gly Ala Ala  Ile Lys Glu Leu Leu  Asp Glu His
    1040                1045                1050

Asp Pro  Leu Leu Lys Lys Glu  Leu Glu Ala Lys Val  Gly Val Leu
    1055                1060                1065

Ala Ile  Asn Met Ser Leu Ser  Ile Ala Ala Thr Val  Ala Ser Ile
    1070                1075                1080

Val Gly  Ile Gly Ala Glu Val  Thr Ile Phe Leu Leu  Pro Ile Ala
    1085                1090                1095

Gly Ile  Ser Ala Gly Ile Pro  Ser Leu Val Asn Asn  Glu Leu Ile
    1100                1105                1110

Leu His  Asp Lys Ala Thr Ser  Val Val Asn Tyr Phe  Asn His Leu
    1115                1120                1125

Ser Glu  Ser Lys Glu Tyr Gly  Pro Leu Lys Thr Glu  Asp Asp Lys
    1130                1135                1140
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Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ala Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Lys Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asn Gly
1235 1240 1245

Thr Lys Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
1325 1330 1335

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Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile
1355 1360 1365

Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Gly Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

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Asp Lys  Ser Ile Asp Phe Ser  Ile Ser Leu Val Ser  Lys Asn Gln
    1535                1540                1545

Ala Lys  Val Asn Gly Leu Tyr  Leu Asn Glu Ser Val  Tyr Ser Ser
    1550                1555                1560

Tyr Leu  Asp Phe Val Lys Asn  Ala Asp Gly His His  Asn Thr Ser
    1565                1570                1575

Asn Phe  Met Asn Leu Phe Leu  Asp Asn Ile Ser Phe  Trp Lys Leu
    1580                1585                1590

Phe Gly  Phe Glu Asn Ile Asn  Phe Val Val Asp Lys  Tyr Phe Thr
    1595                1600                1605

Leu Val  Gly Lys Thr Asn Leu  Gly Tyr Val Glu Phe  Ile Cys Asp
    1610                1615                1620

Asn Asn  Lys Asn Ile Asp Ile  Tyr Phe Gly Glu Trp  Lys Thr Ser
    1625                1630                1635

Ser Ser  Lys Ser Thr Ile Phe  Ser Gly Asn Gly Arg  Asn Val Val
    1640                1645                1650

Val Glu  Pro Ile Tyr Asn Pro  Asp Thr Gly Glu Asp  Ile Ser Thr
    1655                1660                1665

Ser Leu  Asp Phe Ser Tyr Glu  Pro Leu Tyr Gly Ile  Asp Arg Tyr
    1670                1675                1680

Ile Asn  Lys Val Leu Ile Ala  Pro Asp Leu Tyr Thr  Ser Leu Ile
    1685                1690                1695

Asn Ile  Asn Thr Asn Tyr Tyr  Ser Asn Glu Tyr Tyr  Pro Glu Ile
    1700                1705                1710

Ile Val  Leu Asn Pro Asn Thr  Phe His Lys Lys Val  Asn Ile Asn
    1715                1720                1725
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Leu Asp  Ser Ser Ser Phe Glu  Tyr Lys Trp Ser Thr  Glu Gly Ser
    1730                1735                1740

Asp Phe  Ile Leu Val Arg Tyr  Leu Glu Glu Ser Asn  Lys Lys Ile
    1745                1750                1755

Leu Gln  Lys Ile Arg Ile Lys  Gly Ile Leu Ser Asn  Thr Gln Ser
    1760                1765                1770

Phe Asn  Lys Met Ser Ile Asp  Phe Lys Asp Ile Lys  Lys Leu Ser
    1775                1780                1785

Leu Val  Tyr Ile Met Ser Asn  Phe Lys Ser Phe Asn  Ser Glu Asn
    1790                1795                1800

Glu Leu  Asp Arg Asp His Leu  Gly Phe Lys Ile Ile  Asp Asn Lys
    1805                1810                1815

Thr Tyr  Tyr Tyr Asp Glu Ala  Ser Lys Leu Val Lys  Gly Leu Ile
    1820                1825                1830

Asn Ile  Asn Asn Ser Leu Phe  Tyr Phe Asp Pro Ile  Glu Ser Asn
    1835                1840                1845

Leu Val  Thr Gly Trp Gln Thr  Ile Asn Gly Lys Lys  Tyr Tyr Phe
    1850                1855                1860

Asp Ile  Asn Thr Gly Ala Ala  Leu Thr Ser Tyr Lys  Ile Ile Asn
    1865                1870                1875

Gly Lys  His Phe Tyr Phe Asn  Asn Asn Gly Val Met  Gln Leu Gly
    1880                1885                1890

Val Phe  Lys Gly Pro Asp Arg  Phe Glu Tyr Phe Ala  Pro Ala Asn
    1895                1900                1905

Thr Gln  Asn Asn Asn Ile Glu  Gly Gln Ala Ile Val  Tyr Gln Ser
    1910                1915                1920
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Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

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Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Lys Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Ala Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Thr His Leu Tyr Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

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```
Lys Tyr  Tyr Phe Asp Asn Asp  Ser Lys Ala Val Thr  Gly Trp Gln
    2315                2320                2325

Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn Leu Asn  Thr Ala Val
    2330                2335                2340

Ala Val  Thr Gly Trp Gln Thr  Ile Asp Gly Lys Lys  Tyr Tyr Phe
    2345                2350                2355

Asn Leu  Asn Thr Ala Glu Ala  Ala Thr Gly Trp Gln  Thr Ile Asp
    2360                2365                2370

Gly Lys  Lys Tyr Tyr Phe Asn  Thr Asn Thr Phe Ile  Ala Ser Thr
    2375                2380                2385

Gly Tyr  Thr Ser Ile Asn Gly  Lys His Phe Tyr Phe  Asn Thr Asp
    2390                2395                2400

Gly Ile  Met Gln Ile Gly Val  Phe Lys Gly Pro Asn  Gly Phe Glu
    2405                2410                2415

Tyr Phe  Ala Pro Ala Asn Thr  His Asn Asn Asn Ile  Glu Gly Gln
    2420                2425                2430

Ala Ile  Leu Tyr Gln Asn Lys  Phe Leu Thr Leu Asn  Gly Lys Lys
    2435                2440                2445

Tyr Tyr  Phe Ala Ser Asp Ser  Lys Ala Val Thr Gly  Leu Arg Thr
    2450                2455                2460

Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr Asn Thr  Ala Val Ala
    2465                2470                2475

Ala Thr  Gly Trp Gln Thr Ile  Asn Gly Lys Lys Tyr  Tyr Phe Asn
    2480                2485                2490

Thr Asn  Thr Ser Ile Ala Ser  Thr Gly Tyr Thr Ile  Ile Asn Gly
    2495                2500                2505
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Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Arg Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Ile Gly Ala Asn Gly Tyr Lys Ile Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Asn Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Asn Met Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

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Ala Pro Gly Ile Tyr Gly
2705

<210> 702
<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 702

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
130 135 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln

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145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
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355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
530 535 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545 550 555 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys

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565 570 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
580 585 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
595 600 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
610 615 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625 630 635 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
645 650 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
660 665 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
675 680 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
690 695 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705 710 715 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
725 730 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
740 745 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
755 760 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile

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770 775 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785 790 795 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
805 810 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
820 825 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
835 840 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
850 855 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865 870 875 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
885 890 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
900 905 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
915 920 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
930 935 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945 950 955 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
965 970 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala

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            980                 985                 990

Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Tyr Asp Ser  Ile Gln Leu
        995                1000                1005

Val Asn  Leu Ile Ser Asn Ala  Val Asn Asp Thr Ile  Asn Val Leu
    1010                1015                1020

Pro Thr  Ile Thr Glu Gly Ile  Pro Ile Val Ser Thr  Ile Leu Asp
    1025                1030                1035

Gly Ile  Asn Leu Gly Ala Ala  Ile Lys Glu Leu Leu  Asp Glu His
    1040                1045                1050

Asp Pro  Leu Leu Lys Lys Glu  Leu Glu Ala Lys Val  Gly Val Leu
    1055                1060                1065

Ala Ile  Asn Met Ser Leu Ser  Ile Ala Ala Thr Val  Ala Ser Ile
    1070                1075                1080

Val Gly  Ile Gly Ala Glu Val  Thr Ile Phe Leu Leu  Pro Ile Ala
    1085                1090                1095

Gly Ile  Ser Ala Gly Ile Pro  Ser Leu Val Asn Asn  Glu Leu Ile
    1100                1105                1110

Leu His  Asp Lys Ala Thr Ser  Val Val Asn Tyr Phe  Asn His Leu
    1115                1120                1125

Ser Glu  Ser Lys Lys Tyr Gly  Pro Leu Lys Thr Glu  Asp Asp Lys
    1130                1135                1140

Ile Leu  Val Pro Ile Asp Asp  Leu Val Ile Ser Glu  Ile Asp Phe
    1145                1150                1155

Asn Asn  Asn Ser Ile Lys Leu  Gly Thr Cys Asn Ile  Leu Ala Met
    1160                1165                1170

Glu Gly  Gly Ser Gly His Thr  Val Thr Gly Asn Ile  Asp His Phe
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1175 1180 1185

Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly
1235 1240 1245

Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile
1355 1360 1365

Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile

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1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser

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1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser

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1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val

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1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe

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2150 2155 2160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
2330 2335 2340

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe

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2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg

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2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

<210> 703
<211> 2709
<212> PRT
<213> Artificial Sequence

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<220>
<223> Synthetic amino acid sequence

<400> 703

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Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1               5                  10                  15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
            20                  25                  30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Val Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190
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```
Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400
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```
Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
    530                 535                 540

Asn Glu Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545                 550                 555                 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
        595                 600                 605
```

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```
Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
    610                 615                 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625                 630                 635                 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
                645                 650                 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
            660                 665                 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
        675                 680                 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
    690                 695                 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705                 710                 715                 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser Ile
                725                 730                 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
            740                 745                 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
        755                 760                 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
    770                 775                 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785                 790                 795                 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Thr Ser Val Ser Pro
                805                 810                 815
```

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```
Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
            820                 825                 830

Val Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
        835                 840                 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
    850                 855                 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865                 870                 875                 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
                885                 890                 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
            900                 905                 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
        915                 920                 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
    930                 935                 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945                 950                 955                 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
                965                 970                 975

Asp Leu Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
            980                 985                 990

Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Tyr Asp Ser  Ile Gln Leu
        995                 1000                1005

Val Asn  Leu Ile Ser Asn Ala  Val Asn Asp Thr Ile  Asn Val Leu
    1010                1015                1020
```

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```
Pro Thr  Ile Thr Glu Gly Ile  Pro Ile Val Ser Thr  Ile Leu Asp
    1025                1030                1035

Gly Ile  Asn Leu Gly Ala Ala  Ile Lys Glu Leu Leu  Asp Glu His
    1040                1045                1050

Asp Pro  Leu Leu Lys Lys Glu  Leu Glu Ala Lys Val  Gly Val Leu
    1055                1060                1065

Ala Ile  Asn Met Ser Leu Ser  Ile Ala Ala Thr Val  Ala Ser Ile
    1070                1075                1080

Val Gly  Ile Gly Ala Glu Val  Thr Ile Phe Leu Leu  Pro Ile Ala
    1085                1090                1095

Gly Ile  Ser Ala Gly Ile Pro  Ser Leu Val Asn Asn  Glu Leu Ile
    1100                1105                1110

Leu His  Asp Lys Ala Thr Ser  Val Val Asn Tyr Phe  Asn His Leu
    1115                1120                1125

Ser Glu  Ser Lys Glu Tyr Gly  Pro Leu Lys Thr Glu  Asp Asp Lys
    1130                1135                1140

Ile Leu  Val Pro Ile Asp Asp  Leu Val Ile Ser Glu  Ile Asp Phe
    1145                1150                1155

Asn Asn  Asn Ala Ile Lys Leu  Gly Thr Cys Asn Ile  Leu Ala Met
    1160                1165                1170

Glu Gly  Gly Ser Gly His Thr  Val Thr Gly Asn Ile  Asp His Phe
    1175                1180                1185

Phe Ser  Ser Pro Ser Ile Ser  Ser His Ile Pro Ser  Leu Ser Ile
    1190                1195                1200

Tyr Ser  Ala Ile Gly Ile Lys  Thr Glu Asn Leu Asp  Phe Ser Lys
    1205                1210                1215
```

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```
Lys Ile  Met Met Leu Pro Asn  Ala Pro Ser Arg Val  Phe Trp Trp
    1220                1225                1230

Glu Thr  Gly Ala Val Pro Gly  Leu Arg Ser Leu Glu  Asn Asn Gly
    1235                1240                1245

Thr Lys  Leu Leu Asp Ser Ile  Arg Asp Leu Tyr Pro  Gly Lys Phe
    1250                1255                1260

Tyr Trp  Arg Phe Tyr Ala Phe  Phe Asp Tyr Ala Ile  Thr Thr Leu
    1265                1270                1275

Lys Pro  Val Tyr Glu Asp Thr  Asn Ile Lys Ile Lys  Leu Asp Lys
    1280                1285                1290

Asp Thr  Arg Asn Phe Ile Met  Pro Thr Ile Thr Thr  Asn Glu Ile
    1295                1300                1305

Arg Asn  Lys Leu Ser Tyr Ser  Phe Asp Gly Ala Gly  Gly Thr Tyr
    1310                1315                1320

Ser Leu  Leu Leu Ser Ser Tyr  Pro Ile Ser Thr Asn  Ile Asn Leu
    1325                1330                1335

Ser Lys  Asp Asp Leu Trp Ile  Phe Asn Ile Asp Asn  Glu Val Arg
    1340                1345                1350

Glu Ile  Ser Ile Glu Asn Gly  Thr Ile Lys Lys Gly  Lys Leu Ile
    1355                1360                1365

Lys Asp  Val Leu Ser Lys Ile  Asp Ile Asn Lys Asn  Lys Leu Ile
    1370                1375                1380

Ile Gly  Asn Gln Thr Ile Asp  Phe Ser Gly Asp Ile  Asp Asn Lys
    1385                1390                1395

Asp Arg  Tyr Ile Phe Leu Thr  Cys Glu Leu Asp Asp  Lys Ile Ser
    1400                1405                1410
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Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Gly Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Ala Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ala Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Val Asp Lys Tyr Phe Thr
1595 1600 1605

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```
Leu Val  Gly Lys Thr Asn Leu  Gly Tyr Val Glu Phe  Ile Cys Asp
    1610                1615                1620

Asn Asn  Lys Asn Ile Asp Ile  Tyr Phe Gly Glu Trp  Lys Thr Ser
    1625                1630                1635

Ser Ser  Lys Ser Thr Ile Phe  Ser Gly Asn Gly Arg  Asn Val Val
    1640                1645                1650

Val Glu  Pro Ile Tyr Asn Pro  Asp Thr Gly Glu Asp  Ile Ser Thr
    1655                1660                1665

Ser Leu  Asp Phe Ser Tyr Glu  Pro Leu Tyr Gly Ile  Asp Arg Tyr
    1670                1675                1680

Ile Asn  Lys Val Leu Ile Ala  Pro Asp Leu Tyr Thr  Ser Leu Ile
    1685                1690                1695

Asn Ile  Asn Thr Asn Tyr Tyr  Ser Asn Glu Tyr Tyr  Pro Glu Ile
    1700                1705                1710

Ile Val  Leu Asn Pro Asn Thr  Phe His Lys Lys Val  Asn Ile Asn
    1715                1720                1725

Leu Asp  Ser Ser Ser Phe Glu  Tyr Lys Trp Ser Thr  Glu Gly Ser
    1730                1735                1740

Asp Phe  Ile Leu Val Arg Tyr  Leu Glu Glu Ser Asn  Lys Lys Ile
    1745                1750                1755

Leu Gln  Lys Ile Arg Ile Lys  Gly Ile Leu Ser Asn  Thr Gln Ser
    1760                1765                1770

Phe Asn  Lys Met Ser Ile Asp  Phe Lys Asp Ile Lys  Lys Leu Ser
    1775                1780                1785

Leu Val  Tyr Ile Met Ser Asn  Phe Lys Ser Phe Asn  Ser Glu Asn
    1790                1795                1800
```

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Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Ala Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Ser Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asn Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Arg Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

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Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Lys Phe
2180 2185 2190

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Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Ala Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Thr His Leu Tyr Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Val
2330 2335 2340

Ala Val Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

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Gly Tyr  Thr Ser Ile Asn Gly  Lys His Phe Tyr Phe  Asn Thr Asp
    2390                2395                2400

Gly Ile  Met Gln Ile Gly Val  Phe Lys Gly Pro Asn  Gly Phe Glu
    2405                2410                2415

Tyr Phe  Ala Pro Ala Asn Thr  His Asn Asn Asn Ile  Glu Gly Gln
    2420                2425                2430

Ala Ile  Leu Tyr Gln Asn Lys  Phe Leu Thr Leu Asn  Gly Lys Lys
    2435                2440                2445

Tyr Tyr  Phe Ala Ser Asp Ser  Lys Ala Val Thr Gly  Leu Arg Thr
    2450                2455                2460

Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr Asn Thr  Ala Glu Ala
    2465                2470                2475

Ala Thr  Gly Trp Gln Thr Ile  Asn Gly Lys Lys Tyr  Tyr Phe Asn
    2480                2485                2490

Thr Asn  Thr Ser Ile Ala Ser  Thr Gly Tyr Thr Ile  Ile Asn Gly
    2495                2500                2505

Lys His  Phe Tyr Phe Asn Thr  Asp Gly Ile Met Gln  Ile Gly Val
    2510                2515                2520

Phe Lys  Gly Pro Asp Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr
    2525                2530                2535

Asp Ala  Asn Asn Ile Glu Gly  Gln Ala Ile Arg Tyr  Gln Asn Arg
    2540                2545                2550

Phe Leu  Tyr Leu His Asp Asn  Ile Tyr Tyr Phe Gly  Asn Asn Ser
    2555                2560                2565

Lys Ala  Ala Thr Gly Trp Val  Thr Ile Asp Gly Arg  Arg Tyr Tyr
    2570                2575                2580
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Phe Glu Pro Asn Thr Ala Ile Gly Ala Asn Gly Tyr Lys Ile Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Asn Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Asn Met Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

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<213> Artificial Sequence

<220>
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<400> 704

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Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr

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20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
130 135 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145 150 155 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
165 170 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
180 185 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
195 200 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
210 215 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala

225 230 235 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Ala Val Ala Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile

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435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
530 535 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545 550 555 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
565 570 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
580 585 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
595 600 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
610 615 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625 630 635 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys

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645 650 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
660 665 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
675 680 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
690 695 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705 710 715 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
725 730 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
740 745 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
755 760 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
770 775 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785 790 795 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
805 810 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
820 825 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
835 840 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu

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    850                 855                 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865                 870                 875                 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
                885                 890                 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
            900                 905                 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
        915                 920                 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
    930                 935                 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945                 950                 955                 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
                965                 970                 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
            980                 985                 990

Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Tyr Asp Ser  Ile Gln Leu
        995                 1000                1005

Val Asn  Leu Ile Ser Asn Ala  Val Asn Asp Thr Ile  Asn Val Leu
    1010                1015                1020

Pro Thr  Ile Thr Glu Gly Ile  Pro Ile Val Ser Thr  Ile Leu Asp
    1025                1030                1035

Gly Ile  Asn Leu Gly Ala Ala  Ile Lys Glu Leu Leu  Asp Glu His
    1040                1045                1050

Asp Pro  Leu Leu Lys Lys Glu  Leu Glu Ala Lys Val  Gly Val Leu
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1055 1060 1065

Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser Ile
1070 1075 1080

Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile Ala
1085 1090 1095

Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile
1100 1105 1110

Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu
1115 1120 1125

Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys
1130 1135 1140

Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly
1235 1240 1245

Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe

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    1250                1255                1260

Tyr Trp  Arg Phe Tyr Ala Phe  Phe Asp Tyr Ala Ile  Thr Thr Leu
    1265                1270                1275

Lys Pro  Val Tyr Glu Asp Thr  Asn Ile Lys Ile Lys  Leu Asp Lys
    1280                1285                1290

Asp Thr  Arg Asn Phe Ile Met  Pro Thr Ile Thr Thr  Asn Glu Ile
    1295                1300                1305

Arg Asn  Lys Leu Ser Tyr Ser  Phe Asp Gly Ala Gly  Gly Thr Tyr
    1310                1315                1320

Ser Leu  Leu Leu Ser Ser Tyr  Pro Ile Ser Thr Asn  Ile Asn Leu
    1325                1330                1335

Ser Lys  Asp Asp Leu Trp Ile  Phe Asn Ile Asp Asn  Glu Val Arg
    1340                1345                1350

Glu Ile  Ser Ile Glu Asn Gly  Thr Ile Lys Lys Gly  Lys Leu Ile
    1355                1360                1365

Lys Asp  Val Leu Ser Lys Ile  Asp Ile Asn Lys Asn  Lys Leu Ile
    1370                1375                1380

Ile Gly  Asn Gln Thr Ile Asp  Phe Ser Gly Asp Ile  Asp Asn Lys
    1385                1390                1395

Asp Arg  Tyr Ile Phe Leu Thr  Cys Glu Leu Asp Asp  Lys Ile Ser
    1400                1405                1410

Leu Ile  Ile Glu Ile Asn Leu  Val Ala Lys Ser Tyr  Ser Leu Leu
    1415                1420                1425

Leu Ser  Gly Asp Lys Asn Tyr  Leu Ile Ser Asn Leu  Ser Asn Thr
    1430                1435                1440

Ile Glu  Lys Ile Asn Thr Leu  Gly Leu Asp Ser Lys  Asn Ile Ala
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1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val

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1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn

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1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr

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2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn

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2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
2330 2335 2340

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln

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2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn

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2615 2620 2625

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

<210> 705
<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 705

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
50 55 60

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Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Val Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270
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Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Ala Val Ala Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

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```
Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
    530                 535                 540

Asn Glu Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545                 550                 555                 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
        595                 600                 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
    610                 615                 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625                 630                 635                 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
                645                 650                 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
            660                 665                 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
        675                 680                 685
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Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
    690                 695                 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705                 710                 715                 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser Ile
                725                 730                 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
            740                 745                 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
        755                 760                 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
    770                 775                 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785                 790                 795                 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Thr Ser Val Ser Pro
                805                 810                 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
            820                 825                 830

Val Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
        835                 840                 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
    850                 855                 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865                 870                 875                 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
                885                 890                 895
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Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
            900                 905                 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
        915                 920                 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
    930                 935                 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945                 950                 955                 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
                965                 970                 975

Asp Leu Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
            980                 985                 990

Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Tyr Asp Ser  Ile Gln Leu
        995                 1000                1005

Val Asn  Leu Ile Ser Asn Ala  Val Asn Asp Thr Ile  Asn Val Leu
    1010                1015                1020

Pro Thr  Ile Thr Glu Gly Ile  Pro Ile Val Ser Thr  Ile Leu Asp
    1025                1030                1035

Gly Ile  Asn Leu Gly Ala Ala  Ile Lys Glu Leu Leu  Asp Glu His
    1040                1045                1050

Asp Pro  Leu Leu Lys Lys Glu  Leu Glu Ala Lys Val  Gly Val Leu
    1055                1060                1065

Ala Ile  Asn Met Ser Leu Ser  Ile Ala Ala Thr Val  Ala Ser Ile
    1070                1075                1080

Val Gly  Ile Gly Ala Glu Val  Thr Ile Phe Leu Leu  Pro Ile Ala
    1085                1090                1095
```

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```
Gly Ile  Ser Ala Gly Ile Pro  Ser Leu Val Asn Asn  Glu Leu Ile
    1100                1105                1110

Leu His  Asp Lys Ala Thr Ser  Val Val Asn Tyr Phe  Asn His Leu
    1115                1120                1125

Ser Glu  Ser Lys Glu Tyr Gly  Pro Leu Lys Thr Glu  Asp Asp Lys
    1130                1135                1140

Ile Leu  Val Pro Ile Asp Asp  Leu Val Ile Ser Glu  Ile Asp Phe
    1145                1150                1155

Asn Asn  Asn Ala Ile Lys Leu  Gly Thr Cys Asn Ile  Leu Ala Met
    1160                1165                1170

Glu Gly  Gly Ser Gly His Thr  Val Thr Gly Asn Ile  Asp His Phe
    1175                1180                1185

Phe Ser  Ser Pro Ser Ile Ser  Ser His Ile Pro Ser  Leu Ser Ile
    1190                1195                1200

Tyr Ser  Ala Ile Gly Ile Lys  Thr Glu Asn Leu Asp  Phe Ser Lys
    1205                1210                1215

Lys Ile  Met Met Leu Pro Asn  Ala Pro Ser Arg Val  Phe Trp Trp
    1220                1225                1230

Glu Thr  Gly Ala Val Pro Gly  Leu Arg Ser Leu Glu  Asn Asn Gly
    1235                1240                1245

Thr Lys  Leu Leu Asp Ser Ile  Arg Asp Leu Tyr Pro  Gly Lys Phe
    1250                1255                1260

Tyr Trp  Arg Phe Tyr Ala Phe  Phe Asp Tyr Ala Ile  Thr Thr Leu
    1265                1270                1275

Lys Pro  Val Tyr Glu Asp Thr  Asn Ile Lys Ile Lys  Leu Asp Lys
    1280                1285                1290
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Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile
1355 1360 1365

Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

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Lys Asn Ile Leu Glu Phe Tyr Asn Gly Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Ala Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ala Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Val Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

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```
Ile Asn  Lys Val Leu Ile Ala  Pro Asp Leu Tyr Thr  Ser Leu Ile
    1685                1690                1695

Asn Ile  Asn Thr Asn Tyr Tyr  Ser Asn Glu Tyr Tyr  Pro Glu Ile
    1700                1705                1710

Ile Val  Leu Asn Pro Asn Thr  Phe His Lys Lys Val  Asn Ile Asn
    1715                1720                1725

Leu Asp  Ser Ser Ser Phe Glu  Tyr Lys Trp Ser Thr  Glu Gly Ser
    1730                1735                1740

Asp Phe  Ile Leu Val Arg Tyr  Leu Glu Glu Ser Asn  Lys Lys Ile
    1745                1750                1755

Leu Gln  Lys Ile Arg Ile Lys  Gly Ile Leu Ser Asn  Thr Gln Ser
    1760                1765                1770

Phe Asn  Lys Met Ser Ile Asp  Phe Lys Asp Ile Lys  Lys Leu Ser
    1775                1780                1785

Leu Val  Tyr Ile Met Ser Asn  Phe Lys Ser Phe Asn  Ser Glu Asn
    1790                1795                1800

Glu Leu  Asp Arg Asp His Leu  Gly Phe Lys Ile Ile  Asp Asn Lys
    1805                1810                1815

Thr Tyr  Tyr Tyr Asp Glu Ala  Ser Lys Leu Val Lys  Gly Leu Ile
    1820                1825                1830

Asn Ile  Asn Asn Ser Leu Phe  Tyr Phe Asp Pro Ile  Glu Ser Asn
    1835                1840                1845

Leu Val  Thr Gly Trp Gln Thr  Ile Asn Gly Lys Lys  Tyr Tyr Phe
    1850                1855                1860

Asp Ile  Asn Thr Gly Ala Ala  Leu Thr Ser Tyr Lys  Ile Ile Asn
    1865                1870                1875
```

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Gly Lys His Phe Tyr Phe Asn Asn Asn Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Arg Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

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```
Lys Ala  Val Thr Gly Trp Gln  Thr Ile Asp Ser Lys  Lys Tyr Tyr
    2075                 2080                 2085

Phe Asn  Thr Asn Thr Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile
    2090                 2095                 2100

Asp Gly  Lys Lys Tyr Tyr Phe  Asn Thr Asn Thr Ala  Glu Ala Ala
    2105                 2110                 2115

Thr Gly  Trp Gln Thr Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr
    2120                 2125                 2130

Asn Thr  Ser Ile Ala Ser Thr  Gly Tyr Thr Ile Ile  Asn Gly Lys
    2135                 2140                 2145

His Phe  Tyr Phe Asn Thr Asp  Gly Ile Met Gln Ile  Gly Val Phe
    2150                 2155                 2160

Lys Gly  Pro Asn Gly Phe Glu  Tyr Phe Ala Pro Ala  Asn Thr Asp
    2165                 2170                 2175

Ala Asn  Asn Ile Glu Gly Gln  Ala Ile Leu Tyr Gln  Asn Lys Phe
    2180                 2185                 2190

Leu Thr  Leu Asn Gly Lys Lys  Tyr Tyr Phe Ala Ser  Asp Ser Lys
    2195                 2200                 2205

Ala Val  Thr Gly Trp Arg Ile  Ile Asn Asn Lys Lys  Tyr Tyr Phe
    2210                 2215                 2220

Asn Pro  Asn Asn Ala Ile Ala  Ala Thr His Leu Tyr  Thr Ile Asn
    2225                 2230                 2235

Asn Asp  Lys Tyr Tyr Phe Ser  Tyr Asp Gly Ile Leu  Gln Asn Gly
    2240                 2245                 2250

Tyr Ile  Thr Ile Glu Arg Asn  Asn Phe Tyr Phe Asp  Ala Asn Asn
    2255                 2260                 2265
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Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Val
2330 2335 2340

Ala Val Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Ala Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

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```
Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr Asn Thr  Ala Val Ala
    2465                2470                2475

Val Thr  Gly Trp Gln Thr Ile  Asn Gly Lys Lys Tyr  Tyr Phe Asn
    2480                2485                2490

Thr Asn  Thr Ser Ile Ala Ser  Thr Gly Tyr Thr Ile  Ile Ser Gly
    2495                2500                2505

Lys His  Phe Tyr Phe Asn Thr  Asp Gly Ile Met Gln  Ile Gly Val
    2510                2515                2520

Phe Lys  Gly Pro Asp Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr
    2525                2530                2535

Asp Ala  Asn Asn Ile Glu Gly  Gln Ala Ile Arg Tyr  Gln Asn Arg
    2540                2545                2550

Phe Leu  Tyr Leu His Asp Asn  Ile Tyr Tyr Phe Gly  Asn Asn Ser
    2555                2560                2565

Lys Ala  Ala Thr Gly Trp Val  Thr Ile Asp Gly Arg  Arg Tyr Tyr
    2570                2575                2580

Phe Glu  Pro Asn Thr Ala Ile  Gly Ala Asn Gly Tyr  Lys Ile Ile
    2585                2590                2595

Asp Asn  Lys Asn Phe Tyr Phe  Arg Asn Gly Leu Pro  Gln Ile Gly
    2600                2605                2610

Val Phe  Lys Gly Pro Asn Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2615                2620                2625

Thr Asp  Ala Asn Asn Ile Glu  Gly Gln Ala Ile Arg  Tyr Gln Asn
    2630                2635                2640

Arg Phe  Leu His Leu Leu Gly  Asn Ile Tyr Tyr Phe  Gly Asn Asn
    2645                2650                2655
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Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Asn Met Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

<210> 706
<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 706

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr

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            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Val Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
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305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln

515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
530 535 540

Asn Glu Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545 550 555 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
565 570 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
580 585 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
595 600 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
610 615 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625 630 635 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
645 650 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
660 665 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
675 680 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
690 695 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705 710 715 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser Ile

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725 730 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
740 745 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
755 760 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
770 775 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785 790 795 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Thr Ser Val Ser Pro
805 810 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
820 825 830

Val Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
835 840 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
850 855 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865 870 875 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
885 890 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
900 905 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
915 920 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn

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930 935 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945 950 955 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
965 970 975

Asp Leu Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
980 985 990

Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln Leu
995 1000 1005

Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val Leu
1010 1015 1020

Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu Asp
1025 1030 1035

Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu His
1040 1045 1050

Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val Leu
1055 1060 1065

Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser Ile
1070 1075 1080

Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile Ala
1085 1090 1095

Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile
1100 1105 1110

Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu
1115 1120 1125

Ser Glu Ser Lys Glu Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys

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1130 1135 1140

Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ala Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Lys Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asn Gly
1235 1240 1245

Thr Lys Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu

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1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile
1355 1360 1365

Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Gly Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr

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1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Ala Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ala Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Val Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn

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1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Val Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Ala Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Ser Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asn Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Arg Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser

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1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala

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2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Lys Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Ala Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Thr His Leu Tyr Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys

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2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Val
2330 2335 2340

Ala Val Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Ala Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly

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2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Arg Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Ile Gly Ala Asn Gly Tyr Lys Ile Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Asn Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Asn Met Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys

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2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

<210> 707
<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 707

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
130 135 140

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Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Val Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350
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Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
    530                 535                 540

Asn Glu Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545                 550                 555                 560
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Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
        595                 600                 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
    610                 615                 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625                 630                 635                 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
                645                 650                 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
            660                 665                 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
        675                 680                 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
    690                 695                 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705                 710                 715                 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser Ile
                725                 730                 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
            740                 745                 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
        755                 760                 765
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```
Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
    770                 775                 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785                 790                 795                 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Thr Ser Val Ser Pro
                805                 810                 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
            820                 825                 830

Val Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
        835                 840                 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
    850                 855                 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865                 870                 875                 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
                885                 890                 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
            900                 905                 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
        915                 920                 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
    930                 935                 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945                 950                 955                 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
                965                 970                 975
```

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```
Asp Leu Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
            980                 985                 990

Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Tyr Asp Ser  Ile Gln Leu
        995                 1000                1005

Val Asn  Leu Ile Ser Asn Ala  Val Asn Asp Thr Ile  Asn Val Leu
    1010                1015                1020

Pro Thr  Ile Thr Glu Gly Ile  Pro Ile Val Ser Thr  Ile Leu Asp
    1025                1030                1035

Gly Ile  Asn Leu Gly Ala Ala  Ile Lys Glu Leu Leu  Asp Glu His
    1040                1045                1050

Asp Pro  Leu Leu Lys Lys Glu  Leu Glu Ala Lys Val  Gly Val Leu
    1055                1060                1065

Ala Ile  Asn Met Ser Leu Ser  Ile Ala Ala Thr Val  Ala Ser Ile
    1070                1075                1080

Val Gly  Ile Gly Ala Glu Val  Thr Ile Phe Leu Leu  Pro Ile Ala
    1085                1090                1095

Gly Ile  Ser Ala Gly Ile Pro  Ser Leu Val Asn Asn  Glu Leu Ile
    1100                1105                1110

Leu His  Asp Lys Ala Thr Ser  Val Val Asn Tyr Phe  Asn His Leu
    1115                1120                1125

Ser Glu  Ser Lys Glu Tyr Gly  Pro Leu Lys Thr Glu  Asp Asp Lys
    1130                1135                1140

Ile Leu  Val Pro Ile Asp Asp  Leu Val Ile Ser Glu  Ile Asp Phe
    1145                1150                1155

Asn Asn  Asn Ala Ile Lys Leu  Gly Thr Cys Asn Ile  Leu Ala Met
    1160                1165                1170
```

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```
Glu Gly  Gly Ser Gly His Thr  Val Thr Gly Asn Ile  Asp His Phe
    1175                 1180                 1185

Phe Ser  Ser Pro Ser Ile Ser  Ser His Ile Pro Ser  Leu Ser Ile
    1190                 1195                 1200

Tyr Ser  Ala Ile Gly Ile Lys  Thr Glu Asn Leu Asp  Phe Ser Lys
    1205                 1210                 1215

Lys Ile  Met Met Leu Pro Asn  Ala Pro Ser Arg Val  Phe Trp Trp
    1220                 1225                 1230

Glu Thr  Gly Ala Val Pro Gly  Leu Arg Ser Leu Glu  Asn Asn Gly
    1235                 1240                 1245

Thr Lys  Leu Leu Asp Ser Ile  Arg Asp Leu Tyr Pro  Gly Lys Phe
    1250                 1255                 1260

Tyr Trp  Arg Phe Tyr Ala Phe  Phe Asp Tyr Ala Ile  Thr Thr Leu
    1265                 1270                 1275

Lys Pro  Val Tyr Glu Asp Thr  Asn Ile Lys Ile Lys  Leu Asp Lys
    1280                 1285                 1290

Asp Thr  Arg Asn Phe Ile Met  Pro Thr Ile Thr Thr  Asn Glu Ile
    1295                 1300                 1305

Arg Asn  Lys Leu Ser Tyr Ser  Phe Asp Gly Ala Gly  Gly Thr Tyr
    1310                 1315                 1320

Ser Leu  Leu Leu Ser Ser Tyr  Pro Ile Ser Thr Asn  Ile Asn Leu
    1325                 1330                 1335

Ser Lys  Asp Asp Leu Trp Ile  Phe Asn Ile Asp Asn  Glu Val Arg
    1340                 1345                 1350

Glu Ile  Ser Ile Glu Asn Gly  Thr Ile Lys Lys Gly  Lys Leu Ile
    1355                 1360                 1365
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```
Lys Asp  Val Leu Ser Lys Ile  Asp Ile Asn Lys Asn  Lys Leu Ile
    1370                1375                1380

Ile Gly  Asn Gln Thr Ile Asp  Phe Ser Gly Asp Ile  Asp Asn Lys
    1385                1390                1395

Asp Arg  Tyr Ile Phe Leu Thr  Cys Glu Leu Asp Asp  Lys Ile Ser
    1400                1405                1410

Leu Ile  Ile Glu Ile Asn Leu  Val Ala Lys Ser Tyr  Ser Leu Leu
    1415                1420                1425

Leu Ser  Gly Asp Lys Asn Tyr  Leu Ile Ser Asn Leu  Ser Asn Thr
    1430                1435                1440

Ile Glu  Lys Ile Asn Thr Leu  Gly Leu Asp Ser Lys  Asn Ile Ala
    1445                1450                1455

Tyr Asn  Tyr Thr Asp Glu Ser  Asn Asn Lys Tyr Phe  Gly Ala Ile
    1460                1465                1470

Ser Lys  Thr Ser Gln Lys Ser  Ile Ile His Tyr Lys  Lys Asp Ser
    1475                1480                1485

Lys Asn  Ile Leu Glu Phe Tyr  Asn Gly Ser Thr Leu  Glu Phe Asn
    1490                1495                1500

Ser Lys  Asp Phe Ile Ala Glu  Asp Ile Asn Val Phe  Met Lys Asp
    1505                1510                1515

Asp Ile  Asn Thr Ile Thr Gly  Lys Tyr Tyr Val Asp  Asn Asn Thr
    1520                1525                1530

Asp Lys  Ser Ile Asp Phe Ser  Ile Ser Leu Val Ser  Lys Asn Gln
    1535                1540                1545

Ala Lys  Val Asn Gly Leu Tyr  Leu Asn Glu Ser Val  Tyr Ser Ser
    1550                1555                1560
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```
Tyr Leu  Asp Phe Val Lys Asn  Ala Asp Gly His His  Asn Thr Ser
    1565                1570                1575

Asn Phe  Met Asn Leu Phe Leu  Asp Asn Ile Ser Phe  Trp Lys Leu
    1580                1585                1590

Phe Gly  Phe Glu Asn Ile Asn  Phe Val Val Asp Lys  Tyr Phe Thr
    1595                1600                1605

Leu Val  Gly Lys Thr Asn Leu  Gly Tyr Val Glu Phe  Ile Cys Asp
    1610                1615                1620

Asn Asn  Lys Asn Ile Asp Ile  Tyr Phe Gly Glu Trp  Lys Thr Ser
    1625                1630                1635

Ser Ser  Lys Ser Thr Ile Phe  Ser Gly Asn Gly Arg  Asn Val Val
    1640                1645                1650

Val Glu  Pro Ile Tyr Asn Pro  Asp Thr Gly Glu Asp  Ile Ser Thr
    1655                1660                1665

Ser Leu  Asp Phe Ser Tyr Glu  Pro Leu Tyr Gly Ile  Asp Arg Tyr
    1670                1675                1680

Ile Asn  Lys Val Leu Ile Ala  Pro Asp Leu Tyr Thr  Ser Leu Ile
    1685                1690                1695

Asn Ile  Asn Thr Asn Tyr Tyr  Ser Asn Glu Tyr Tyr  Pro Glu Ile
    1700                1705                1710

Ile Val  Leu Asn Pro Asn Thr  Phe His Lys Lys Val  Asn Ile Asn
    1715                1720                1725

Leu Asp  Ser Ser Ser Phe Glu  Tyr Lys Trp Ser Thr  Glu Gly Ser
    1730                1735                1740

Asp Phe  Ile Leu Val Arg Tyr  Leu Glu Glu Ser Asn  Lys Lys Ile
    1745                1750                1755
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Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Val Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Ala Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Ser Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asn Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Arg Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

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```
Tyr Phe  Asn Pro Asn Asn Ala  Ile Ala Ala Val Gly  Leu Gln Val
    1955                1960                1965

Ile Asp  Asn Asn Lys Tyr Tyr  Phe Asn Pro Asp Thr  Ala Ile Ile
    1970                1975                1980

Ser Lys  Gly Trp Gln Thr Val  Asn Gly Ser Arg Tyr  Tyr Phe Asp
    1985                1990                1995

Thr Asp  Thr Ala Ile Ala Phe  Asn Gly Tyr Lys Thr  Ile Asp Gly
    2000                2005                2010

Lys His  Phe Tyr Phe Asp Ser  Asp Cys Val Val Lys  Ile Gly Val
    2015                2020                2025

Phe Ser  Gly Ser Asn Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr
    2030                2035                2040

Tyr Asn  Asn Asn Ile Glu Gly  Gln Ala Ile Val Tyr  Gln Ser Lys
    2045                2050                2055

Phe Leu  Thr Leu Asn Gly Lys  Lys Tyr Tyr Phe Asp  Asn Asn Ser
    2060                2065                2070

Lys Ala  Val Thr Gly Trp Gln  Thr Ile Asp Ser Lys  Lys Tyr Tyr
    2075                2080                2085

Phe Asn  Thr Asn Thr Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile
    2090                2095                2100

Asp Gly  Lys Lys Tyr Tyr Phe  Asn Thr Asn Thr Ala  Glu Val Ala
    2105                2110                2115

Thr Gly  Trp Gln Thr Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr
    2120                2125                2130

Asn Thr  Ser Ile Ala Ser Thr  Gly Tyr Thr Ile Ile  Asn Gly Lys
    2135                2140                2145
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```
His Phe  Tyr Phe Asn Thr Asp  Gly Ile Met Gln Ile  Gly Val Phe
    2150                2155                2160

Lys Gly  Pro Asp Gly Phe Glu  Tyr Phe Ala Pro Ala  Asn Thr Asp
    2165                2170                2175

Ala Asn  Asn Ile Glu Gly Gln  Ala Ile Leu Tyr Gln  Asn Lys Phe
    2180                2185                2190

Leu Thr  Leu Asn Gly Lys Lys  Tyr Tyr Phe Ala Ser  Asp Ser Lys
    2195                2200                2205

Ala Val  Thr Gly Trp Arg Ile  Ile Asn Asn Lys Lys  Tyr Tyr Phe
    2210                2215                2220

Asn Pro  Asn Asn Ala Ile Ala  Ala Thr His Leu Tyr  Thr Ile Asn
    2225                2230                2235

Asn Asp  Lys Tyr Tyr Phe Ser  Tyr Asp Gly Ile Leu  Gln Asn Gly
    2240                2245                2250

Tyr Ile  Thr Ile Glu Arg Asn  Asn Phe Tyr Phe Asp  Ala Asn Asn
    2255                2260                2265

Glu Ser  Lys Met Val Thr Gly  Val Phe Lys Gly Pro  Asn Gly Phe
    2270                2275                2280

Glu Tyr  Phe Ala Pro Ala Asn  Thr His Asn Asn Asn  Ile Glu Gly
    2285                2290                2295

Gln Ala  Ile Val Tyr Gln Asn  Lys Phe Leu Thr Leu  Asn Gly Lys
    2300                2305                2310

Lys Tyr  Tyr Phe Asp Asn Asp  Ser Lys Ala Val Thr  Gly Trp Gln
    2315                2320                2325

Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn Leu Asn  Thr Ala Val
    2330                2335                2340
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Ala Val Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ser Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Ala Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala
2465 2470 2475

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Asp
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

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Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Arg Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Ile Gly Ala Asn Gly Tyr Lys Ile Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Asn Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Asn Met Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

<210> 708
<211> 2709
<212> PRT

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<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 708

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Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
            20                  25                  30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
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180 185 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
195 200 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
210 215 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225 230 235 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Gly
245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Ala Val Ala Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln

385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465 470 475 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
485 490 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
500 505 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
515 520 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
530 535 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545 550 555 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
565 570 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
580 585 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile

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595 600 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
610 615 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625 630 635 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
645 650 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
660 665 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
675 680 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
690 695 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705 710 715 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
725 730 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
740 745 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
755 760 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
770 775 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785 790 795 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro

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805 810 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
820 825 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
835 840 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
850 855 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865 870 875 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
885 890 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
900 905 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
915 920 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
930 935 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945 950 955 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
965 970 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
980 985 990

Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln Leu
995 1000 1005

Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val Leu

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1010 1015 1020

Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu Asp
1025 1030 1035

Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu His
1040 1045 1050

Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val Leu
1055 1060 1065

Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser Ile
1070 1075 1080

Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile Ala
1085 1090 1095

Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile
1100 1105 1110

Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu
1115 1120 1125

Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys
1130 1135 1140

Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser Lys

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```
    1205                1210                1215

Lys Ile  Met Met Leu Pro Asn  Ala Pro Ser Arg Val  Phe Trp Trp
    1220                1225                1230

Glu Thr  Gly Ala Val Pro Gly  Leu Arg Ser Leu Glu  Asn Asp Gly
    1235                1240                1245

Thr Arg  Leu Leu Asp Ser Ile  Arg Asp Leu Tyr Pro  Gly Lys Phe
    1250                1255                1260

Tyr Trp  Arg Phe Tyr Ala Phe  Phe Asp Tyr Ala Ile  Thr Thr Leu
    1265                1270                1275

Lys Pro  Val Tyr Glu Asp Thr  Asn Ile Lys Ile Lys  Leu Asp Lys
    1280                1285                1290

Asp Thr  Arg Asn Phe Ile Met  Pro Thr Ile Thr Thr  Asn Glu Ile
    1295                1300                1305

Arg Asn  Lys Leu Ser Tyr Ser  Phe Asp Gly Ala Gly  Gly Thr Tyr
    1310                1315                1320

Ser Leu  Leu Leu Ser Ser Tyr  Pro Ile Ser Thr Asn  Ile Asn Leu
    1325                1330                1335

Ser Lys  Asp Asp Leu Trp Ile  Phe Asn Ile Asp Asn  Glu Val Arg
    1340                1345                1350

Glu Ile  Ser Ile Glu Asn Gly  Thr Ile Lys Lys Gly  Lys Leu Ile
    1355                1360                1365

Lys Asp  Val Leu Ser Lys Ile  Asp Ile Asn Lys Asn  Lys Leu Ile
    1370                1375                1380

Ile Gly  Asn Gln Thr Ile Asp  Phe Ser Gly Asp Ile  Asp Asn Lys
    1385                1390                1395

Asp Arg  Tyr Ile Phe Leu Thr  Cys Glu Leu Asp Asp  Lys Ile Ser
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    1400                1405                1410

Leu Ile  Ile Glu Ile Asn Leu  Val Ala Lys Ser Tyr  Ser Leu Leu
    1415                1420                1425

Leu Ser  Gly Asp Lys Asn Tyr  Leu Ile Ser Asn Leu  Ser Asn Ile
    1430                1435                1440

Ile Glu  Lys Ile Asn Thr Leu  Gly Leu Asp Ser Lys  Asn Ile Ala
    1445                1450                1455

Tyr Asn  Tyr Thr Asp Glu Ser  Asn Asn Lys Tyr Phe  Gly Ala Ile
    1460                1465                1470

Ser Lys  Thr Ser Gln Lys Ser  Ile Ile His Tyr Lys  Lys Asp Ser
    1475                1480                1485

Lys Asn  Ile Leu Glu Phe Tyr  Asn Asp Ser Thr Leu  Glu Phe Asn
    1490                1495                1500

Ser Lys  Asp Phe Ile Ala Glu  Asp Ile Asn Val Phe  Met Lys Asp
    1505                1510                1515

Asp Ile  Asn Thr Ile Thr Gly  Lys Tyr Tyr Val Asp  Asn Asn Thr
    1520                1525                1530

Asp Lys  Ser Ile Asp Phe Ser  Ile Ser Leu Val Ser  Lys Asn Gln
    1535                1540                1545

Val Lys  Val Asn Gly Leu Tyr  Leu Asn Glu Ser Val  Tyr Ser Ser
    1550                1555                1560

Tyr Leu  Asp Phe Val Lys Asn  Ser Asp Gly His His  Asn Thr Ser
    1565                1570                1575

Asn Phe  Met Asn Leu Phe Leu  Asp Asn Ile Ser Phe  Trp Lys Leu
    1580                1585                1590

Phe Gly  Phe Glu Asn Ile Asn  Phe Val Ile Asp Lys  Tyr Phe Thr
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1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn

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1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Ile Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp

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1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe

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2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
2330 2335 2340

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr

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2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr

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2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

<210> 709
<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 709

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

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Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
            20                  25                  30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
        35                  40                  45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn Ser
    50                  55                  60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65                  70                  75                  80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
                85                  90                  95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Val Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg Thr
    210                 215                 220
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Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430
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```
Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
    530                 535                 540

Asn Glu Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545                 550                 555                 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
        595                 600                 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
    610                 615                 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625                 630                 635                 640
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Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
645 650 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
660 665 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
675 680 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
690 695 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705 710 715 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser Ile
725 730 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
740 745 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
755 760 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
770 775 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785 790 795 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Thr Ser Val Ser Pro
805 810 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
820 825 830

Val Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
835 840 845

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```
Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
    850                 855                 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865                 870                 875                 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
                885                 890                 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
            900                 905                 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
        915                 920                 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
    930                 935                 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945                 950                 955                 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
                965                 970                 975

Asp Leu Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
            980                 985                 990

Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Tyr Asp Ser  Ile Gln Leu
        995                 1000                1005

Val Asn  Leu Ile Ser Asn Ala  Val Asn Asp Thr Ile  Asn Val Leu
    1010                1015                1020

Pro Thr  Ile Thr Glu Gly Ile  Pro Ile Val Ser Thr  Ile Leu Asp
    1025                1030                1035

Gly Ile  Asn Leu Gly Ala Ala  Ile Lys Glu Leu Leu  Asp Glu His
    1040                1045                1050
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Asp Pro  Leu Leu Lys Lys Glu  Leu Glu Ala Lys Val  Gly Val Leu
    1055                1060                1065

Ala Ile  Asn Met Ser Leu Ser  Ile Ala Ala Thr Val  Ala Ser Ile
    1070                1075                1080

Val Gly  Ile Gly Ala Glu Val  Thr Ile Phe Leu Leu  Pro Ile Ala
    1085                1090                1095

Gly Ile  Ser Ala Gly Ile Pro  Ser Leu Val Asn Asn  Glu Leu Ile
    1100                1105                1110

Leu His  Asp Lys Ala Thr Ser  Val Val Asn Tyr Phe  Asn His Leu
    1115                1120                1125

Ser Glu  Ser Lys Glu Tyr Gly  Pro Leu Lys Thr Glu  Asp Asp Lys
    1130                1135                1140

Ile Leu  Val Pro Ile Asp Asp  Leu Val Ile Ser Glu  Ile Asp Phe
    1145                1150                1155

Asn Asn  Asn Ala Ile Lys Leu  Gly Thr Cys Asn Ile  Leu Ala Met
    1160                1165                1170

Glu Gly  Gly Ser Gly His Thr  Val Thr Gly Asn Ile  Asp His Phe
    1175                1180                1185

Phe Ser  Ser Pro Ser Ile Ser  Ser His Ile Pro Ser  Leu Ser Ile
    1190                1195                1200

Tyr Ser  Ala Ile Gly Ile Lys  Thr Glu Asn Leu Asp  Phe Ser Lys
    1205                1210                1215

Lys Ile  Met Met Leu Pro Asn  Ala Pro Ser Arg Val  Phe Trp Trp
    1220                1225                1230

Glu Thr  Gly Ala Val Pro Gly  Leu Arg Ser Leu Glu  Asn Asn Gly
    1235                1240                1245
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Thr Lys Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile
1355 1360 1365

Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

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Ile Glu  Lys Ile Asn Thr Leu  Gly Leu Asp Ser Lys  Asn Ile Ala
    1445                1450                1455

Tyr Asn  Tyr Thr Asp Glu Ser  Asn Asn Lys Tyr Phe  Gly Ala Ile
    1460                1465                1470

Ser Lys  Thr Ser Gln Lys Ser  Ile Ile His Tyr Lys  Lys Asp Ser
    1475                1480                1485

Lys Asn  Ile Leu Glu Phe Tyr  Asn Gly Ser Thr Leu  Glu Phe Asn
    1490                1495                1500

Ser Lys  Asp Phe Ile Ala Glu  Asp Ile Asn Val Phe  Met Lys Asp
    1505                1510                1515

Asp Ile  Asn Thr Ile Thr Gly  Lys Tyr Tyr Val Asp  Asn Asn Thr
    1520                1525                1530

Asp Lys  Ser Ile Asp Phe Ser  Ile Ser Leu Val Ser  Lys Asn Gln
    1535                1540                1545

Ala Lys  Val Asn Gly Leu Tyr  Leu Asn Glu Ser Val  Tyr Ser Ser
    1550                1555                1560

Tyr Leu  Asp Phe Val Lys Asn  Ala Asp Gly His His  Asn Thr Ser
    1565                1570                1575

Asn Phe  Met Asn Leu Phe Leu  Asp Asn Ile Ser Phe  Trp Lys Leu
    1580                1585                1590

Phe Gly  Phe Glu Asn Ile Asn  Phe Val Val Asp Lys  Tyr Phe Thr
    1595                1600                1605

Leu Val  Gly Lys Thr Asn Leu  Gly Tyr Val Glu Phe  Ile Cys Asp
    1610                1615                1620

Asn Asn  Lys Asn Ile Asp Ile  Tyr Phe Gly Glu Trp  Lys Thr Ser
    1625                1630                1635
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Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Val Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Ala Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

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Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Ser Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asn Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Arg Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

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Phe Ser Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Lys Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Ala Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

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Asn Pro  Asn Asn Ala Ile Ala  Ala Thr His Leu Tyr  Thr Ile Asn
    2225                 2230                 2235

Asn Asp  Lys Tyr Tyr Phe Ser  Tyr Asp Gly Ile Leu  Gln Asn Gly
    2240                 2245                 2250

Tyr Ile  Thr Ile Glu Arg Asn  Asn Phe Tyr Phe Asp  Ala Asn Asn
    2255                 2260                 2265

Glu Ser  Lys Met Val Thr Gly  Val Phe Lys Gly Pro  Asn Gly Phe
    2270                 2275                 2280

Glu Tyr  Phe Ala Pro Ala Asn  Thr His Asn Asn Asn  Ile Glu Gly
    2285                 2290                 2295

Gln Ala  Ile Val Tyr Gln Asn  Lys Phe Leu Thr Leu  Asn Gly Lys
    2300                 2305                 2310

Lys Tyr  Tyr Phe Asp Asn Asp  Ser Lys Ala Val Thr  Gly Trp Gln
    2315                 2320                 2325

Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn Leu Asn  Thr Ala Val
    2330                 2335                 2340

Ala Val  Thr Gly Trp Gln Thr  Ile Asp Gly Lys Lys  Tyr Tyr Phe
    2345                 2350                 2355

Asn Leu  Asn Thr Ala Glu Ala  Ala Thr Gly Trp Gln  Thr Ile Asp
    2360                 2365                 2370

Gly Lys  Lys Tyr Tyr Phe Asn  Thr Asn Thr Phe Ile  Ala Ser Thr
    2375                 2380                 2385

Gly Tyr  Thr Ser Ile Asn Gly  Lys His Phe Tyr Phe  Asn Thr Asp
    2390                 2395                 2400

Gly Ile  Met Gln Ile Gly Val  Phe Lys Gly Pro Asn  Gly Phe Glu
    2405                 2410                 2415
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Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Ala Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Arg Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Ile Gly Ala Asn Gly Tyr Lys Ile Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

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Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Asp Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Asn Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Asn Met Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

<210> 710
<211> 2709
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 710

Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
1 5 10 15

Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser

50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
100 105 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
115 120 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
130 135 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145 150 155 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
165 170 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
180 185 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
195 200 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
210 215 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225 230 235 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
245 250 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu

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260 265 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Ala Val Ala Met Leu
275 280 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
290 295 300

Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305 310 315 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
325 330 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
340 345 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
355 360 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
370 375 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385 390 395 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
405 410 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
420 425 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
435 440 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
450 455 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile

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465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510

Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
    530                 535                 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545                 550                 555                 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
        595                 600                 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
    610                 615                 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625                 630                 635                 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
                645                 650                 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
            660                 665                 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
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675 680 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
690 695 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705 710 715 720

Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
725 730 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
740 745 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
755 760 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
770 775 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785 790 795 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
805 810 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
820 825 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
835 840 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
850 855 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865 870 875 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr

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                885                 890                 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
            900                 905                 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
        915                 920                 925

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
    930                 935                 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945                 950                 955                 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
                965                 970                 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
            980                 985                 990

Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Tyr Asp Ser  Ile Gln Leu
        995                 1000                1005

Val Asn  Leu Ile Ser Asn Ala  Val Asn Asp Thr Ile  Asn Val Leu
    1010                1015                1020

Pro Thr  Ile Thr Glu Gly Ile  Pro Ile Val Ser Thr  Ile Leu Asp
    1025                1030                1035

Gly Ile  Asn Leu Gly Ala Ala  Ile Lys Glu Leu Leu  Asp Glu His
    1040                1045                1050

Asp Pro  Leu Leu Lys Lys Glu  Leu Glu Ala Lys Val  Gly Val Leu
    1055                1060                1065

Ala Ile  Asn Met Ser Leu Ser  Ile Ala Ala Thr Val  Ala Ser Ile
    1070                1075                1080

Val Gly  Ile Gly Ala Glu Val  Thr Ile Phe Leu Leu  Pro Ile Ala
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1085 1090 1095

Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile
1100 1105 1110

Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu
1115 1120 1125

Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys
1130 1135 1140

Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly
1235 1240 1245

Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asn Thr Asn Ile Lys Ile Lys Leu Asp Lys

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1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
1325 1330 1335

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
1340 1345 1350

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile
1355 1360 1365

Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile
1370 1375 1380

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
1385 1390 1395

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser
1400 1405 1410

Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu
1415 1420 1425

Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr
1430 1435 1440

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
1445 1450 1455

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
1460 1465 1470

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser

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1475 1480 1485

Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe Asn
1490 1495 1500

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp
1505 1510 1515

Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr

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1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn

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1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asp Asn Ser

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2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ser Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn

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2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
2300 2305 2310

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
2315 2320 2325

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
2330 2335 2340

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
2345 2350 2355

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
2360 2365 2370

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
2375 2380 2385

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
2390 2395 2400

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2405 2410 2415

Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
2420 2425 2430

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2435 2440 2445

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr

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2450 2455 2460

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
2465 2470 2475

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
2480 2485 2490

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn

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2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

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<211> 2709
<212> PRT
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Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile Arg
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Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu Tyr
20 25 30

Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu Lys
35 40 45

Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr Ser
50 55 60

Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys Glu
65 70 75 80

Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn Leu
85 90 95

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```
His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu Tyr
            100                 105                 110

Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu Trp
        115                 120                 125

Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile Val
    130                 135                 140

Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile Gln
145                 150                 155                 160

Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu Phe
                165                 170                 175

Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln Ile
            180                 185                 190

Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His Leu
        195                 200                 205

Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg Thr
    210                 215                 220

Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg Ala
225                 230                 235                 240

Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln Glu
                245                 250                 255

Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg Leu
            260                 265                 270

Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Ala Val Ala Met Leu
        275                 280                 285

Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser Ser
    290                 295                 300
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```
Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met Lys
305                 310                 315                 320

Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys Leu
                325                 330                 335

Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys Ser
            340                 345                 350

Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser Asp
        355                 360                 365

Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln Ala
    370                 375                 380

Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu Gln
385                 390                 395                 400

Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala Ile
                405                 410                 415

Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp Ser
            420                 425                 430

Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys Ile
        435                 440                 445

Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr Ile
    450                 455                 460

Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe Ile
465                 470                 475                 480

Asn Leu Gln Glu Asn Thr Ile Glu Lys Thr Leu Lys Ala Ser Asp Leu
                485                 490                 495

Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu Gln
            500                 505                 510
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```
Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr Gln
        515                 520                 525

Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu Asp
    530                 535                 540

Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr Leu
545                 550                 555                 560

Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser Lys
                565                 570                 575

Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser Tyr
            580                 585                 590

Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile Ile
        595                 600                 605

Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser Asp
    610                 615                 620

Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu Arg
625                 630                 635                 640

Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly Lys
                645                 650                 655

Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser Leu
            660                 665                 670

Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile Ser
        675                 680                 685

Pro Lys Asn Val Glu Val Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr
    690                 695                 700

Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser Ile
705                 710                 715                 720
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Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser Ile
725 730 735

Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg
740 745 750

Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu Ala
755 760 765

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
770 775 780

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
785 790 795 800

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
805 810 815

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
820 825 830

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
835 840 845

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
850 855 860

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
865 870 875 880

Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr
885 890 895

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
900 905 910

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
915 920 925

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```
Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
    930                 935                 940

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
945                 950                 955                 960

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
                965                 970                 975

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
            980                 985                 990

Gln Leu Phe Ser Thr Gly Leu Asn  Thr Ile Tyr Asp Ser  Ile Gln Leu
        995                 1000                1005

Val Asn  Leu Ile Ser Asn Ala  Val Asn Asp Thr Ile  Asn Val Leu
    1010                1015                1020

Pro Thr  Ile Thr Glu Gly Ile  Pro Ile Val Ser Thr  Ile Leu Asp
    1025                1030                1035

Gly Ile  Asn Leu Gly Ala Ala  Ile Lys Glu Leu Leu  Asp Glu His
    1040                1045                1050

Asp Pro  Leu Leu Lys Lys Glu  Leu Glu Ala Lys Val  Gly Val Leu
    1055                1060                1065

Ala Ile  Asn Met Ser Leu Ser  Ile Ala Ala Thr Val  Ala Ser Ile
    1070                1075                1080

Val Gly  Ile Gly Ala Glu Val  Thr Ile Phe Leu Leu  Pro Ile Ala
    1085                1090                1095

Gly Ile  Ser Ala Gly Ile Pro  Ser Leu Val Asn Asn  Glu Leu Ile
    1100                1105                1110

Leu His  Asp Lys Ala Thr Ser  Val Val Asn Tyr Phe  Asn His Leu
    1115                1120                1125
```

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Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys
1130 1135 1140

Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
1145 1150 1155

Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met
1160 1165 1170

Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe
1175 1180 1185

Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
1190 1195 1200

Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser Lys
1205 1210 1215

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
1220 1225 1230

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly
1235 1240 1245

Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe
1250 1255 1260

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu
1265 1270 1275

Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys
1280 1285 1290

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
1295 1300 1305

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr
1310 1315 1320

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```
Ser Leu  Leu Leu Ser Ser Tyr  Pro Ile Ser Thr Asn  Ile Asn Leu
    1325                1330                1335

Ser Lys  Asp Asp Leu Trp Ile  Phe Asn Ile Asp Asn  Glu Val Arg
    1340                1345                1350

Glu Ile  Ser Ile Glu Asn Gly  Thr Ile Lys Lys Gly  Lys Leu Ile
    1355                1360                1365

Lys Asp  Val Leu Ser Lys Ile  Asp Ile Asn Lys Asn  Lys Leu Ile
    1370                1375                1380

Ile Gly  Asn Gln Thr Ile Asp  Phe Ser Gly Asp Ile  Asp Asn Lys
    1385                1390                1395

Asp Arg  Tyr Ile Phe Leu Thr  Cys Glu Leu Asp Asp  Lys Ile Ser
    1400                1405                1410

Leu Ile  Ile Glu Ile Asn Leu  Val Ala Lys Ser Tyr  Ser Leu Leu
    1415                1420                1425

Leu Ser  Gly Asp Lys Asn Tyr  Leu Ile Ser Asn Leu  Ser Asn Thr
    1430                1435                1440

Ile Glu  Lys Ile Asn Thr Leu  Gly Leu Asp Ser Lys  Asn Ile Ala
    1445                1450                1455

Tyr Asn  Tyr Thr Asp Glu Ser  Asn Asn Lys Tyr Phe  Gly Ala Ile
    1460                1465                1470

Ser Lys  Thr Ser Gln Lys Ser  Ile Ile His Tyr Lys  Lys Asp Ser
    1475                1480                1485

Lys Asn  Ile Leu Glu Phe Tyr  Asn Asp Ser Thr Leu  Glu Phe Asn
    1490                1495                1500

Ser Lys  Asp Phe Ile Ala Glu  Asp Ile Asn Val Phe  Met Lys Asp
    1505                1510                1515
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Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
1520 1525 1530

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
1535 1540 1545

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser
1550 1555 1560

Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
1565 1570 1575

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
1580 1585 1590

Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr
1595 1600 1605

Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp
1610 1615 1620

Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser
1625 1630 1635

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val
1640 1645 1650

Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr
1655 1660 1665

Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
1670 1675 1680

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile
1685 1690 1695

Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile
1700 1705 1710

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Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
1715 1720 1725

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser
1730 1735 1740

Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile
1745 1750 1755

Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser
1760 1765 1770

Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser
1775 1780 1785

Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn
1790 1795 1800

Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
1805 1810 1815

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
1820 1825 1830

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn
1835 1840 1845

Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1850 1855 1860

Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn
1865 1870 1875

Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly
1880 1885 1890

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1895 1900 1905

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Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1910 1915 1920

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
1925 1930 1935

Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr
1940 1945 1950

Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
1955 1960 1965

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1970 1975 1980

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1985 1990 1995

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
2015 2020 2025

Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
2045 2050 2055

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Leu Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
2075 2080 2085

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
2090 2095 2100

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Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
2105 2110 2115

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
2120 2125 2130

Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
2135 2140 2145

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2150 2155 2160

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2165 2170 2175

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe
2180 2185 2190

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
2195 2200 2205

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn
2225 2230 2235

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
2240 2245 2250

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
2255 2260 2265

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
2270 2275 2280

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
2285 2290 2295

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```
Gln Ala  Ile Val Tyr Gln Asn  Lys Phe Leu Thr Leu  Asn Gly Lys
    2300                2305                2310

Lys Tyr  Tyr Phe Asp Asn Asp  Ser Lys Ala Val Thr  Gly Trp Gln
    2315                2320                2325

Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn Leu Asn  Thr Ala Glu
    2330                2335                2340

Ala Ala  Thr Gly Trp Gln Thr  Ile Asp Gly Lys Lys  Tyr Tyr Phe
    2345                2350                2355

Asn Leu  Asn Thr Ala Glu Ala  Ala Thr Gly Trp Gln  Thr Ile Asp
    2360                2365                2370

Gly Lys  Lys Tyr Tyr Phe Asn  Thr Asn Thr Phe Ile  Ala Ser Thr
    2375                2380                2385

Gly Tyr  Thr Ser Ile Asn Gly  Lys His Phe Tyr Phe  Asn Thr Asp
    2390                2395                2400

Gly Ile  Met Gln Ile Gly Val  Phe Lys Gly Pro Asn  Gly Phe Glu
    2405                2410                2415

Tyr Phe  Ala Pro Ala Asn Thr  Asp Ala Asn Asn Ile  Glu Gly Gln
    2420                2425                2430

Ala Ile  Leu Tyr Gln Asn Lys  Phe Leu Thr Leu Asn  Gly Lys Lys
    2435                2440                2445

Tyr Tyr  Phe Gly Ser Asp Ser  Lys Ala Val Thr Gly  Leu Arg Thr
    2450                2455                2460

Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr Asn Thr  Ala Val Ala
    2465                2470                2475

Val Thr  Gly Trp Gln Thr Ile  Asn Gly Lys Lys Tyr  Tyr Phe Asn
    2480                2485                2490
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Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
2495 2500 2505

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2510 2515 2520

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2525 2530 2535

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2540 2545 2550

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
2555 2560 2565

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr
2570 2575 2580

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
2585 2590 2595

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
2600 2605 2610

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2615 2620 2625

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2630 2635 2640

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
2645 2650 2655

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
2660 2665 2670

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
2675 2680 2685

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Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
2690 2695 2700

Ala Pro Gly Ile Tyr Gly
2705

<210> 712
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 712

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Val Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile

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130 135 140

Val Glu Ser Ala Thr Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145 150 155 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Tyr Arg Lys Arg Met Glu
165 170 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Thr Gln
180 185 190

Arg Glu Glu Asn Pro Asp Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
195 200 205

Leu Ser Asn Glu Tyr Ser Lys Asp Ile Asp Glu Leu Asn Ser Tyr Ile
210 215 220

Glu Glu Ser Leu Asn Lys Val Thr Glu Asn Ser Gly Asn Asp Val Arg
225 230 235 240

Asn Phe Glu Glu Phe Lys Gly Gly Glu Ser Phe Lys Leu Tyr Glu Gln
245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
260 265 270

Ile Ser Ala Leu Lys Glu Val Gly Gly Val Tyr Leu Ala Val Ala Met
275 280 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
290 295 300

Ser Val Thr Val Asp Phe Trp Glu Met Val Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys

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            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Ala Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Lys Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Thr Val Val Asp Lys Glu Tyr
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545                 550                 555                 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
            580                 585                 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
        595                 600                 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
    610                 615                 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625                 630                 635                 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
                645                 650                 655

Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser Thr
            660                 665                 670

Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
        675                 680                 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Val
    690                 695                 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Arg Val Lys Asp
705                 710                 715                 720

Lys Val Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
                725                 730                 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
            740                 745                 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
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        755                 760                 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
    770                 775                 780

Lys Ile Ile Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785                 790                 795                 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
                805                 810                 815

Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
            820                 825                 830

Thr Gln Val Val Glu Gly Arg Ile Glu Glu Ala Lys Ser Leu Thr Ser
        835                 840                 845

Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser Ile
    850                 855                 860

Ser Asp Ala Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Glu Glu Ser
865                 870                 875                 880

His Phe Ile Ser Phe Glu Asp Ile Leu Glu Thr Asp Glu Gly Phe Ser
                885                 890                 895

Ile Arg Phe Ile Asp Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Ala Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
        915                 920                 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Ala Thr His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
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                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Val  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050

Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
    1055                1060                1065

Asn Leu  Thr Ala Ala Thr Thr  Ala Ile Ile Thr Ser  Ser Leu Gly
    1070                1075                1080

Ile Ala  Ser Gly Phe Ser Ile  Leu Leu Val Pro Leu  Ala Gly Ile
    1085                1090                1095

Ser Ala  Gly Ile Pro Ser Leu  Val Asn Asn Glu Leu  Ile Leu Arg
    1100                1105                1110

Asp Lys  Ala Thr Lys Val Val  Asp Tyr Phe Ser His  Ile Ser Leu
    1115                1120                1125

Ala Glu  Ser Glu Gly Ala Phe  Thr Ser Leu Asp Asp  Lys Ile Met
    1130                1135                1140

Met Pro  Gln Asp Asp Leu Val  Ile Ser Glu Ile Asp  Phe Asn Asn
    1145                1150                1155

Asn Ser  Ile Thr Leu Gly Lys  Cys Glu Ile Trp Arg  Met Glu Gly
```

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1160 1165 1170

Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Thr Arg Ser Phe Ile Val Pro Val Ile Thr Thr Glu Tyr Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Asn Ile Asn Ile Glu Leu Asn
1325 1330 1335

Glu Asn Asp Thr Trp Val Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu

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1355 1360 1365

Asn Ile Leu Ser Lys Leu Ser Ile Glu Asp Asn Lys Ile Ile Leu
1370 1375 1380

Asp Asn His Glu Ile Asn Phe Ser Gly Thr Leu Asn Gly Gly Asn
1385 1390 1395

Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Val Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Val Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Thr Leu Met Ala Asn Ser Asn Ser Val Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Leu Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Met Asp Asp Lys Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Cys Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Ser
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asn Ser Lys Pro
1490 1495 1500

Leu Phe Gly Tyr Cys Ser Asn Asp Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asp Val Ile Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Phe Thr Ile Gln Asp Glu Asn Thr
1535 1540 1545

Ile Lys Leu Asn Gly Val Tyr Leu Asp Glu Asn Gly Val Ala Glu

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1550 1555 1560

Ile Leu Lys Phe Met Asn Lys Lys Gly Ser Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe
1580 1585 1590

Ile Asn Ser Leu Gln Ser Asn Thr Lys Leu Ile Leu Asp Thr Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Lys Asp Asn Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Lys Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Ile Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Ile Tyr Glu Ala Asn Asn Thr Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Thr Asn Tyr Ile Ser Glu Lys Ile
1715 1720 1725

Asn Ile Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Ser Asp Phe Ile Leu Met Ser Thr Asp Glu Glu Asn Lys

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1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Thr Asn Val Phe Lys Gly Asn
1760 1765 1770

Thr Ile Ser Asp Lys Ile Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Ser Ile Asn Lys Val Ile Ser Thr Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Val Glu Gly Leu Leu Asn Tyr Asp Leu Gly Leu Ile Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Val Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Ile
1835 1840 1845

Lys Asn Leu Ile Thr Gly Phe Thr Thr Ile Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Asp Asn Gly Gly Ala Ala Ser Val Gly Glu Thr
1865 1870 1875

Ile Ile Asp Gly Lys Asn Tyr Tyr Phe Ser Gln Asn Gly Val Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asp Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Thr Ile Asp Glu Asn Val Tyr Tyr Phe Gly
1925 1930 1935

Asp Asn Tyr Arg Ala Ala Ile Glu Trp Gln Thr Leu Asp Asp Glu

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1940 1945 1950

Val Tyr Tyr Phe Ser Thr Asp Thr Gly Arg Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Asp Lys Phe Tyr Phe Asn Ser Asp Gly Ile
1970 1975 1980

Met Gln Lys Gly Phe Val Asn Ile Asn Asp Lys Thr Phe Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Ser Gly Tyr Thr Glu Ile Asp Gly
2000 2005 2010

Lys Tyr Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Ala Asp Gly Phe Lys Tyr Phe Ala His His Asp Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Ala Leu Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Ile Ser Ile Ile
2090 2095 2100

Asn Asp Gly Lys Tyr Tyr Phe Asn Asp Ser Gly Ile Met Gln Ile
2105 2110 2115

Gly Phe Val Thr Ile Asn Asn Glu Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Val Glu Ser Gly Met Gln Asn Ile Asp Asp Asn Tyr Phe

2135 2140 2145

Tyr Ile Asp Glu Asn Gly Leu Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asp Pro Glu Thr Lys Lys Ala Tyr Lys Gly Ile Asn Val Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Asn Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Thr Phe Glu Asp Asn His Tyr Tyr Phe Asn Glu Asp Gly
2255 2260 2265

Ile Met Gln Tyr Gly Tyr Leu Asn Ile Glu Asp Lys Thr Phe Tyr
2270 2275 2280

Phe Ser Glu Asp Gly Ile Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly

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2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 713
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 713

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

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```
Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335
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```
Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540
```

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```
Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545                 550                 555                 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
            580                 585                 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
        595                 600                 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
    610                 615                 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625                 630                 635                 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
                645                 650                 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
            660                 665                 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
        675                 680                 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
    690                 695                 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705                 710                 715                 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
                725                 730                 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
            740                 745                 750
```

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```
Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
        755                 760                 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
    770                 775                 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785                 790                 795                 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
                805                 810                 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
            820                 825                 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
        835                 840                 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
    850                 855                 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865                 870                 875                 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
                885                 890                 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
        915                 920                 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960
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Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
965 970 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
980 985 990

Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp Ala Ala Lys Val Val Glu
995 1000 1005

Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu Pro Thr
1010 1015 1020

Leu Ser Glu Gly Leu Pro Ile Ile Ala Thr Ile Ile Asp Gly Val
1025 1030 1035

Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp Pro
1040 1045 1050

Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala Val
1055 1060 1065

Asn Leu Thr Thr Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu Gly
1070 1075 1080

Val Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile
1085 1090 1095

Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg
1100 1105 1110

Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Val Ser Leu
1115 1120 1125

Val Glu Thr Glu Gly Val Phe Thr Leu Leu Asp Asp Lys Ile Met
1130 1135 1140

Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

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Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

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Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile Leu
1370 1375 1380

Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys Thr
1535 1540 1545

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Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Arg Lys Gly Asn Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe
1580 1585 1590

Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

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```
Asp Gly  Asn Asp Phe Ile Leu  Met Ser Thr Ser Glu  Glu Asn Lys
    1745                1750                1755

Val Ser  Gln Val Lys Ile Arg  Phe Val Asn Val Phe  Lys Asp Lys
    1760                1765                1770

Thr Leu  Ala Asn Lys Leu Ser  Phe Asn Phe Ser Asp  Lys Gln Asp
    1775                1780                1785

Val Pro  Val Ser Glu Ile Ile  Leu Ser Phe Thr Pro  Ser Tyr Tyr
    1790                1795                1800

Glu Asp  Gly Leu Ile Gly Tyr  Asp Leu Gly Leu Val  Ser Leu Tyr
    1805                1810                1815

Asn Glu  Lys Phe Tyr Ile Asn  Asn Phe Gly Met Met  Val Ser Gly
    1820                1825                1830

Leu Ile  Tyr Ile Asn Asp Ser  Leu Tyr Tyr Phe Lys  Pro Pro Val
    1835                1840                1845

Asn Asn  Leu Ile Thr Gly Phe  Val Thr Val Gly Asp  Asp Lys Tyr
    1850                1855                1860

Tyr Phe  Asn Pro Ile Asn Gly  Gly Ala Ala Ser Ile  Gly Glu Thr
    1865                1870                1875

Ile Ile  Asp Asp Lys Asn Tyr  Tyr Phe Asn Gln Ser  Gly Val Leu
    1880                1885                1890

Gln Thr  Gly Val Phe Ser Thr  Glu Asp Gly Phe Lys  Tyr Phe Ala
    1895                1900                1905

Pro Ala  Asn Thr Leu Asp Glu  Asn Leu Glu Gly Glu  Ala Ile Asp
    1910                1915                1920

Phe Thr  Gly Lys Leu Ile Ile  Asp Glu Asn Ile Tyr  Tyr Phe Asp
    1925                1930                1935
```

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Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Tyr Lys Tyr Tyr Phe Asn Ser Asp Gly Val
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

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Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

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Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 714
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 714

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Val Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val

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        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Val Glu Ser Ala Thr Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Tyr Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Thr Gln
            180                 185                 190

Arg Glu Glu Asn Pro Asp Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Asp Ile Asp Glu Leu Asn Ser Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Val Thr Glu Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Gly Gly Glu Ser Phe Lys Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Val Gly Gly Val Tyr Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Val Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
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325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Ala Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Lys Asn Tyr Phe Glu Gly Ser Leu Gly Glu

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530 535 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Thr Val Val Asp Lys Glu Tyr
545 550 555 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
565 570 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
580 585 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
595 600 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
610 615 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625 630 635 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
645 650 655

Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser Thr
660 665 670

Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
675 680 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Val
690 695 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Arg Val Lys Asp
705 710 715 720

Lys Val Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
725 730 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu

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740 745 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
755 760 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
770 775 780

Lys Ile Ile Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785 790 795 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
805 810 815

Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
820 825 830

Thr Gln Val Val Glu Gly Arg Ile Glu Glu Ala Lys Ser Leu Thr Ser
835 840 845

Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser Ile
850 855 860

Ser Asp Ala Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Glu Glu Ser
865 870 875 880

His Phe Ile Ser Phe Glu Asp Ile Leu Glu Thr Asp Glu Gly Phe Ser
885 890 895

Ile Arg Phe Ile Asp Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
900 905 910

Glu Lys Ala Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
915 920 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
930 935 940

Lys Lys Val Asn Leu Asp Ala Thr His Glu Val Asn Thr Leu Asn Ala

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945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Val  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050

Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
    1055                1060                1065

Asn Leu  Thr Ala Ala Thr Thr  Ala Ile Ile Thr Ser  Ser Leu Gly
    1070                1075                1080

Ile Ala  Ser Gly Phe Ser Ile  Leu Leu Val Pro Leu  Ala Gly Ile
    1085                1090                1095

Ser Ala  Gly Ile Pro Ser Leu  Val Asn Asn Glu Leu  Ile Leu Arg
    1100                1105                1110

Asp Lys  Ala Thr Lys Val Val  Asp Tyr Phe Ser His  Ile Ser Leu
    1115                1120                1125

Ala Glu  Ser Glu Gly Ala Phe  Thr Ser Leu Asp Asp  Lys Ile Met
    1130                1135                1140

Met Pro  Gln Asp Asp Leu Val  Ile Ser Glu Ile Asp  Phe Asn Asn
```

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1145 1150 1155

Asn Ser Ile Thr Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Thr Arg Ser Phe Ile Val Pro Val Ile Thr Thr Glu Tyr Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Asn Ile Asn Ile Glu Leu Asn
1325 1330 1335

Glu Asn Asp Thr Trp Val Ile Asp Val Asp Asn Val Val Arg Asp

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1340 1345 1350

Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Asn Ile Leu Ser Lys Leu Ser Ile Glu Asp Asn Lys Ile Ile Leu
1370 1375 1380

Asp Asn His Glu Ile Asn Phe Ser Gly Thr Leu Asn Gly Gly Asn
1385 1390 1395

Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Val Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Val Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Thr Leu Met Ala Asn Ser Asn Ser Val Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Leu Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Met Asp Asp Lys Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Cys Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Ser
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asn Ser Lys Pro
1490 1495 1500

Leu Phe Gly Tyr Cys Ser Asn Asp Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asp Val Ile Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Phe Thr Ile Gln Asp Glu Asn Thr

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1535 1540 1545

Ile Lys Leu Asn Gly Val Tyr Leu Asp Glu Asn Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Lys Lys Gly Ser Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe
1580 1585 1590

Ile Asn Ser Leu Gln Ser Asn Thr Lys Leu Ile Leu Asp Thr Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Lys Asp Asn Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Lys Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Ile Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Ile Tyr Glu Ala Asn Asn Thr Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Thr Asn Tyr Ile Ser Glu Lys Ile
1715 1720 1725

Asn Ile Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn

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1730 1735 1740

Asp Gly Ser Asp Phe Ile Leu Met Ser Thr Asp Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Thr Asn Val Phe Lys Gly Asn
1760 1765 1770

Thr Ile Ser Asp Lys Ile Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Ser Ile Asn Lys Val Ile Ser Thr Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Val Glu Gly Leu Leu Asn Tyr Asp Leu Gly Leu Ile Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Val Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Ile
1835 1840 1845

Lys Asn Leu Ile Thr Gly Phe Thr Thr Ile Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Asp Asn Gly Gly Ala Ala Ser Val Gly Glu Thr
1865 1870 1875

Ile Ile Asp Gly Lys Asn Tyr Tyr Phe Ser Gln Asn Gly Val Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asp Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Thr Ile Asp Glu Asn Val Tyr Tyr Phe Gly

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1925 1930 1935

Asp Asn Tyr Arg Ala Ala Ile Glu Trp Gln Thr Leu Asp Asp Glu
1940 1945 1950

Val Tyr Tyr Phe Ser Thr Asp Thr Gly Arg Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Asp Lys Phe Tyr Phe Asn Ser Asp Gly Ile
1970 1975 1980

Met Gln Lys Gly Phe Val Asn Ile Asn Asp Lys Thr Phe Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Ser Gly Tyr Thr Glu Ile Asp Gly
2000 2005 2010

Lys Tyr Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Ala Asp Gly Phe Lys Tyr Phe Ala His His Asp Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Ala Leu Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Ile Ser Ile Ile
2090 2095 2100

Asn Asp Gly Lys Tyr Tyr Phe Asn Asp Ser Gly Ile Met Gln Ile
2105 2110 2115

Gly Phe Val Thr Ile Asn Asn Glu Val Phe Tyr Phe Ser Asp Ser

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2120 2125 2130

Gly Ile Val Glu Ser Gly Met Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Glu Asn Gly Leu Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asp Pro Glu Thr Lys Lys Ala Tyr Lys Gly Ile Asn Val Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Asn Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Thr Phe Glu Asp Asn His Tyr Tyr Phe Asn Glu Asp Gly
2255 2260 2265

Ile Met Gln Tyr Gly Tyr Leu Asn Ile Glu Asp Lys Thr Phe Tyr
2270 2275 2280

Phe Ser Glu Asp Gly Ile Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp

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2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 715
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 715

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

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```
Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320
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Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
        515                 520                 525
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```
Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545                 550                 555                 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
            580                 585                 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
        595                 600                 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
    610                 615                 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625                 630                 635                 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
                645                 650                 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
            660                 665                 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
        675                 680                 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
    690                 695                 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705                 710                 715                 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
                725                 730                 735
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Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
            740                 745                 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
        755                 760                 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
    770                 775                 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785                 790                 795                 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
                805                 810                 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
            820                 825                 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
        835                 840                 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
    850                 855                 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865                 870                 875                 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
                885                 890                 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
        915                 920                 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940
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```
Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Ile  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050

Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
    1055                1060                1065

Asn Leu  Thr Thr Ala Thr Thr  Ala Ile Ile Thr Ser  Ser Leu Gly
    1070                1075                1080

Val Ala  Ser Gly Phe Ser Ile  Leu Leu Val Pro Leu  Ala Gly Ile
    1085                1090                1095

Ser Ala  Gly Ile Pro Ser Leu  Val Asn Asn Glu Leu  Val Leu Arg
    1100                1105                1110

Asp Lys  Ala Thr Lys Val Val  Asp Tyr Phe Lys His  Val Ser Leu
    1115                1120                1125

Val Glu  Thr Glu Gly Val Phe  Thr Leu Leu Asp Asp  Lys Ile Met
    1130                1135                1140
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Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

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Glu Ser  Asp Val Trp Ile Ile  Asp Val Asp Asn Val  Val Arg Asp
    1340                1345                1350

Val Thr  Ile Glu Ser Asp Lys  Ile Lys Lys Gly Asp  Leu Ile Glu
    1355                1360                1365

Gly Ile  Leu Ser Thr Leu Ser  Ile Glu Glu Asn Lys  Ile Ile Leu
    1370                1375                1380

Asn Ser  His Glu Ile Asn Phe  Ser Gly Glu Val Asn  Gly Ser Asn
    1385                1390                1395

Gly Phe  Val Ser Leu Thr Phe  Ser Ile Leu Glu Gly  Ile Asn Ala
    1400                1405                1410

Ile Ile  Glu Val Asp Leu Leu  Ser Lys Ser Tyr Lys  Leu Leu Ile
    1415                1420                1425

Ser Gly  Glu Leu Lys Ile Leu  Met Leu Asn Ser Asn  His Ile Gln
    1430                1435                1440

Gln Lys  Ile Asp Tyr Ile Gly  Phe Asn Ser Glu Leu  Gln Lys Asn
    1445                1450                1455

Ile Pro  Tyr Ser Phe Val Asp  Ser Glu Gly Lys Glu  Asn Gly Phe
    1460                1465                1470

Ile Asn  Gly Ser Thr Lys Glu  Gly Leu Phe Val Ser  Glu Leu Pro
    1475                1480                1485

Asp Val  Val Leu Ile Ser Lys  Val Tyr Met Asp Asp  Ser Lys Pro
    1490                1495                1500

Ser Phe  Gly Tyr Tyr Ser Asn  Asn Leu Lys Asp Val  Lys Val Ile
    1505                1510                1515

Thr Lys  Asp Asn Val Asn Ile  Leu Thr Gly Tyr Tyr  Leu Lys Asp
    1520                1525                1530
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Asp Ile  Lys Ile Ser Leu Ser  Leu Thr Leu Gln Asp  Glu Lys Thr
    1535                1540                1545

Ile Lys  Leu Asn Ser Val His  Leu Asp Glu Ser Gly  Val Ala Glu
    1550                1555                1560

Ile Leu  Lys Phe Met Asn Arg  Lys Gly Asn Thr Asn  Thr Ser Asp
    1565                1570                1575

Ser Leu  Met Ser Phe Leu Glu  Ser Met Asn Ile Lys  Ser Ile Phe
    1580                1585                1590

Val Asn  Phe Leu Gln Ser Asn  Ile Lys Phe Ile Leu  Asp Ala Asn
    1595                1600                1605

Phe Ile  Ile Ser Gly Thr Thr  Ser Ile Gly Gln Phe  Glu Phe Ile
    1610                1615                1620

Cys Asp  Glu Asn Asp Asn Ile  Gln Pro Tyr Phe Ile  Lys Phe Asn
    1625                1630                1635

Thr Leu  Glu Thr Asn Tyr Thr  Leu Tyr Val Gly Asn  Arg Gln Asn
    1640                1645                1650

Met Ile  Val Glu Pro Asn Tyr  Asp Leu Asp Asp Ser  Gly Asp Ile
    1655                1660                1665

Ser Ser  Thr Val Ile Asn Phe  Ser Gln Lys Tyr Leu  Tyr Gly Ile
    1670                1675                1680

Asp Ser  Cys Val Asn Lys Val  Val Ile Ser Pro Asn  Ile Tyr Thr
    1685                1690                1695

Asp Glu  Ile Asn Ile Thr Pro  Val Tyr Glu Thr Asn  Asn Thr Tyr
    1700                1705                1710

Pro Glu  Val Ile Val Leu Asp  Ala Asn Tyr Ile Asn  Glu Lys Ile
    1715                1720                1725
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```
Asn Val  Asn Ile Asn Asp Leu  Ser Ile Arg Tyr Val  Trp Ser Asn
    1730                1735                1740

Asp Gly  Asn Asp Phe Ile Leu  Met Ser Thr Ser Glu  Glu Asn Lys
    1745                1750                1755

Val Ser  Gln Val Lys Ile Arg  Phe Val Asn Val Phe  Lys Asp Lys
    1760                1765                1770

Thr Leu  Ala Asn Lys Leu Ser  Phe Asn Phe Ser Asp  Lys Gln Asp
    1775                1780                1785

Val Pro  Val Ser Glu Ile Ile  Leu Ser Phe Thr Pro  Ser Tyr Tyr
    1790                1795                1800

Glu Asp  Gly Leu Ile Gly Tyr  Asp Leu Gly Leu Val  Ser Leu Tyr
    1805                1810                1815

Asn Glu  Lys Phe Tyr Ile Asn  Asn Phe Gly Met Met  Val Ser Gly
    1820                1825                1830

Leu Ile  Tyr Ile Asn Asp Ser  Leu Tyr Tyr Phe Lys  Pro Pro Val
    1835                1840                1845

Asn Asn  Leu Ile Thr Gly Phe  Val Thr Val Gly Asp  Asp Lys Tyr
    1850                1855                1860

Tyr Phe  Asn Pro Ile Asn Gly  Gly Ala Ala Ser Ile  Gly Glu Thr
    1865                1870                1875

Ile Ile  Asp Asp Lys Asn Tyr  Tyr Phe Asn Gln Ser  Gly Val Leu
    1880                1885                1890

Gln Thr  Gly Val Phe Ser Thr  Glu Asp Gly Phe Lys  Tyr Phe Ala
    1895                1900                1905

Pro Ala  Asn Thr Leu Asp Glu  Asn Leu Glu Gly Glu  Ala Ile Asp
    1910                1915                1920
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Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Tyr Lys Tyr Tyr Phe Asn Ser Asp Gly Val
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

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Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

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Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 716
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 716

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn

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            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
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305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
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515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
530 535 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545 550 555 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
565 570 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
580 585 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
595 600 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
610 615 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625 630 635 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
645 650 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
660 665 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
675 680 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
690 695 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705 710 715 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val

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725 730 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
740 745 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
755 760 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
770 775 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785 790 795 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
805 810 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
820 825 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
835 840 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
850 855 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865 870 875 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
885 890 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
900 905 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
915 920 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val

930 935 940

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945 950 955 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
965 970 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
980 985 990

Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp Ala Ala Lys Val Val Glu
995 1000 1005

Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu Pro Thr
1010 1015 1020

Leu Ser Glu Gly Leu Pro Ile Ile Ala Thr Ile Ile Asp Gly Val
1025 1030 1035

Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp Pro
1040 1045 1050

Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala Val
1055 1060 1065

Asn Leu Thr Thr Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu Gly
1070 1075 1080

Ile Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile
1085 1090 1095

Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg
1100 1105 1110

Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Val Ser Leu
1115 1120 1125

Val Glu Thr Glu Gly Val Phe Thr Leu Leu Asp Asp Lys Ile Met

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1130 1135 1140

Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser

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1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile Leu
1370 1375 1380

Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Arg Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp

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1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys Thr
1535 1540 1545

Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Arg Lys Gly Asn Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe
1580 1585 1590

Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile

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1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp

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1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Val
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val

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2105 2110 2115

Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn

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2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 717
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 717

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

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Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300
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Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

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Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
530 535 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545 550 555 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
565 570 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
580 585 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
595 600 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
610 615 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625 630 635 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
645 650 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
660 665 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
675 680 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
690 695 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705 710 715 720

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Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
                725                 730                 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
            740                 745                 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
        755                 760                 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
    770                 775                 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785                 790                 795                 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
                805                 810                 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
            820                 825                 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
        835                 840                 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
    850                 855                 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865                 870                 875                 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
                885                 890                 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
        915                 920                 925
```

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```
Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Ile  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050

Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
    1055                1060                1065

Asn Leu  Thr Thr Ala Thr Thr  Ala Ile Ile Thr Ser  Ser Leu Gly
    1070                1075                1080

Ile Ala  Ser Gly Phe Ser Ile  Leu Leu Val Pro Leu  Ala Gly Ile
    1085                1090                1095

Ser Ala  Gly Ile Pro Ser Leu  Val Asn Asn Glu Leu  Val Leu Arg
    1100                1105                1110

Asp Lys  Ala Thr Lys Val Val  Asp Tyr Phe Lys His  Val Ser Leu
    1115                1120                1125
```

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Val Glu Thr Glu Gly Val Phe Thr Leu Leu Asp Asp Lys Ile Met
1130 1135 1140

Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

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Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile Leu
1370 1375 1380

Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

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```
Thr Lys  Asp Asn Val Asn Ile  Leu Thr Gly Tyr Tyr  Leu Lys Asp
    1520                1525                1530

Asp Ile  Lys Ile Ser Leu Ser  Leu Thr Leu Gln Asp  Glu Lys Thr
    1535                1540                1545

Ile Lys  Leu Asn Ser Val His  Leu Asp Glu Ser Gly  Val Ala Glu
    1550                1555                1560

Ile Leu  Lys Phe Met Asn Arg  Lys Gly Asn Thr Asn  Thr Ser Asp
    1565                1570                1575

Ser Leu  Met Ser Phe Leu Glu  Ser Met Asn Ile Lys  Ser Ile Phe
    1580                1585                1590

Val Asn  Phe Leu Gln Ser Asn  Ile Lys Phe Ile Leu  Asp Ala Asn
    1595                1600                1605

Phe Ile  Ile Ser Gly Thr Thr  Ser Ile Gly Gln Phe  Glu Phe Ile
    1610                1615                1620

Cys Asp  Glu Asn Asp Asn Ile  Gln Pro Tyr Phe Ile  Lys Phe Asn
    1625                1630                1635

Thr Leu  Glu Thr Asn Tyr Thr  Leu Tyr Val Gly Asn  Arg Gln Asn
    1640                1645                1650

Met Ile  Val Glu Pro Asn Tyr  Asp Leu Asp Asp Ser  Gly Asp Ile
    1655                1660                1665

Ser Ser  Thr Val Ile Asn Phe  Ser Gln Lys Tyr Leu  Tyr Gly Ile
    1670                1675                1680

Asp Ser  Cys Val Asn Lys Val  Val Ile Ser Pro Asn  Ile Tyr Thr
    1685                1690                1695

Asp Glu  Ile Asn Ile Thr Pro  Val Tyr Glu Thr Asn  Asn Thr Tyr
    1700                1705                1710
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Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala
1895 1900 1905

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Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Val
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile
2090 2095 2100

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Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

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Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 718
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 718

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn

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                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
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290 295 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu

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            500                 505                 510

Gln Glu Met Ala Ser Leu Trp Thr Phe Asp Asp Ala Arg Ala Lys Val
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545                 550                 555                 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
            580                 585                 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Ile Leu Phe Gln
        595                 600                 605

Lys Asn Ile Glu Asn Ser Glu Val Ala Tyr Tyr Tyr Asn Pro Gly Asp
    610                 615                 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Arg Ile Pro Ser Ile Ile Ser
625                 630                 635                 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
                645                 650                 655

Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser Thr
            660                 665                 670

Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Ser Lys
        675                 680                 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
    690                 695                 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
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705 710 715 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
725 730 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Asn Glu Gly Arg Arg Glu
740 745 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
755 760 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
770 775 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785 790 795 800

Gln Glu Ile Arg Asn Asn Ser Asn Leu Ser Asp Ile Glu Leu Glu Glu
805 810 815

Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
820 825 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
835 840 845

Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser Ile
850 855 860

Ser Asp Ser Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Asp Asp Ser
865 870 875 880

His Phe Ile Ser Phe Glu Asp Ile Ser Lys Thr Glu Asp Gly Phe Ser
885 890 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
900 905 910

Glu Lys Glu Ile Phe Ser Glu Tyr Ala Asn His Ile Glu Arg Glu Ile

915 920 925

Ser Asn Ile Lys Asp Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
930 935 940

Lys Lys Val Asn Leu Asp Ala Ile His Glu Val Asn Thr Leu Asn Ala
945 950 955 960

Ala Phe Phe Ile Gln Ser Leu Ile Gly Tyr Ser Ser Ser Lys Glu Ser
965 970 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
980 985 990

Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp Ala Ala Lys Val Val Glu
995 1000 1005

Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu Pro Thr
1010 1015 1020

Leu Ser Glu Gly Leu Pro Val Ile Ala Thr Ile Ile Asp Gly Val
1025 1030 1035

Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp Pro
1040 1045 1050

Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala Val
1055 1060 1065

Asn Leu Thr Ala Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu Gly
1070 1075 1080

Ile Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile
1085 1090 1095

Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg
1100 1105 1110

Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Ile Ser Leu

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1115 1120 1125

Val Glu Thr Glu Gly Ala Phe Thr Leu Leu Asp Asp Lys Ile Met
1130 1135 1140

Ile Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asn Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ser Pro Thr Ile Thr Tyr Ile Lys Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Glu Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp His Tyr Lys Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Asn Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu His Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe His Gly Ser Gly Gly Thr Tyr Ala

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1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Asp Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Asp Asn Lys Ile Ile Leu
1370 1375 1380

Asn His His Glu Ile Asn Phe Ser Gly Asp Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Ile Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile

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1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Phe Thr Leu Gln Asp Glu Lys Thr
1535 1540 1545

Ile Lys Leu Asn Gly Val His Leu Asp Glu Ser Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Lys Lys Gly Ser Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Val Asn Ile Lys Ser Ile Phe
1580 1585 1590

Val Asn Phe Leu Gln Ser Lys Ile Asn Phe Ile Leu Asp Ala Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Thr Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Asn Tyr

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1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Ser Ala Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Thr Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asn Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Ile Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Leu Lys Tyr Phe Ala

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1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Glu
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met Tyr Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Ile
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Lys Lys Tyr Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Ile Glu Ile Asp Gly
2000 2005 2010

Lys Tyr Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Ser Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Ala Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Tyr Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Val Gly Leu Ser Leu Ile

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2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asn Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Glu Lys Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Glu Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Asp Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Ile Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Asn Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asp Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Gln

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2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

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<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 719

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1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

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Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Ala Val Ala Met
        275                 280                 285
```

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Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495
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```
Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545                 550                 555                 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
            580                 585                 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
        595                 600                 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
    610                 615                 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625                 630                 635                 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
                645                 650                 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
            660                 665                 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
        675                 680                 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
    690                 695                 700
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```
Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705                 710                 715                 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
                725                 730                 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
            740                 745                 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
        755                 760                 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
    770                 775                 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785                 790                 795                 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
                805                 810                 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
            820                 825                 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
        835                 840                 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
    850                 855                 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865                 870                 875                 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
                885                 890                 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910
```

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```
Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
        915                 920                 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Ile  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050

Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
    1055                1060                1065

Asn Leu  Thr Thr Ala Thr Thr  Ala Ile Ile Thr Ser  Ser Leu Gly
    1070                1075                1080

Ile Ala  Ser Gly Phe Ser Ile  Leu Leu Val Pro Leu  Ala Gly Ile
    1085                1090                1095

Ser Ala  Gly Ile Pro Ser Leu  Val Asn Asn Glu Leu  Val Leu Arg
    1100                1105                1110
```

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Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Val Ser Leu
1115 1120 1125

Val Glu Thr Glu Gly Val Phe Thr Leu Leu Asp Asp Lys Ile Met
1130 1135 1140

Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile Arg
1295 1300 1305

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```
Glu Lys  Leu Ser Tyr Ser Phe  Tyr Gly Ser Gly Gly  Thr Tyr Ala
    1310                1315                1320

Leu Ser  Leu Ser Gln Tyr Asn  Met Gly Ile Asn Ile  Glu Leu Ser
    1325                1330                1335

Glu Ser  Asp Val Trp Ile Ile  Asp Val Asp Asn Val  Val Arg Asp
    1340                1345                1350

Val Thr  Ile Glu Ser Asp Lys  Ile Lys Lys Gly Asp  Leu Ile Glu
    1355                1360                1365

Gly Ile  Leu Ser Thr Leu Ser  Ile Glu Glu Asn Lys  Ile Ile Leu
    1370                1375                1380

Asn Ser  His Glu Ile Asn Phe  Ser Gly Glu Val Asn  Gly Ser Asn
    1385                1390                1395

Gly Phe  Val Ser Leu Thr Phe  Ser Ile Leu Glu Gly  Ile Asn Ala
    1400                1405                1410

Ile Ile  Glu Val Asp Leu Leu  Ser Lys Ser Tyr Lys  Leu Leu Ile
    1415                1420                1425

Ser Gly  Glu Leu Lys Ile Leu  Met Leu Asn Ser Asn  His Ile Gln
    1430                1435                1440

Gln Lys  Ile Asp Tyr Ile Gly  Phe Asn Ser Glu Leu  Gln Lys Asn
    1445                1450                1455

Ile Pro  Tyr Ser Phe Val Asp  Ser Glu Gly Lys Glu  Asn Gly Phe
    1460                1465                1470

Ile Asn  Gly Ser Thr Lys Glu  Gly Leu Phe Val Ser  Glu Leu Pro
    1475                1480                1485

Asp Val  Val Leu Ile Ser Lys  Val Tyr Met Asp Asp  Ser Lys Pro
    1490                1495                1500
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Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys Thr
1535 1540 1545

Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Arg Lys Gly Asn Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe
1580 1585 1590

Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

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Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu
1880 1885 1890

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Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Val
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

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Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

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Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 720
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 720

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr

65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
130 135 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145 150 155 160

Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
165 170 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
180 185 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
195 200 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
210 215 220

Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val Arg
225 230 235 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu Gln
245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
260 265 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Ala Val Ala Met

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275 280 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
290 295 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp

485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Thr Phe Asp Asp Ala Arg Ala Lys Val
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
530 535 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545 550 555 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
565 570 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
580 585 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Ile Leu Phe Gln
595 600 605

Lys Asn Ile Glu Asn Ser Glu Val Ala Tyr Tyr Tyr Asn Pro Gly Asp
610 615 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Arg Ile Pro Ser Ile Ile Ser
625 630 635 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
645 650 655

Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser Thr
660 665 670

Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Ser Lys
675 680 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile

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690 695 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705 710 715 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
725 730 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Asn Glu Gly Arg Arg Glu
740 745 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
755 760 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
770 775 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785 790 795 800

Gln Glu Ile Arg Asn Asn Ser Asn Leu Ser Asp Ile Glu Leu Glu Glu
805 810 815

Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
820 825 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
835 840 845

Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser Ile
850 855 860

Ser Asp Ser Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Asp Asp Ser
865 870 875 880

His Phe Ile Ser Phe Glu Asp Ile Ser Lys Thr Glu Asp Gly Phe Ser
885 890 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr

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            900                 905                 910

Glu Lys Glu Ile Phe Ser Glu Tyr Ala Asn His Ile Glu Arg Glu Ile
        915                 920                 925

Ser Asn Ile Lys Asp Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Ala Ile His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Gly Tyr Ser Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Val  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050

Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
    1055                1060                1065

Asn Leu  Thr Ala Ala Thr Thr  Ala Ile Ile Thr Ser  Ser Leu Gly
    1070                1075                1080

Ile Ala  Ser Gly Phe Ser Ile  Leu Leu Val Pro Leu  Ala Gly Ile
    1085                1090                1095

Ser Ala  Gly Ile Pro Ser Leu  Val Asn Asn Glu Leu  Val Leu Arg
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1100 1105 1110

Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Ile Ser Leu
1115 1120 1125

Val Glu Thr Glu Gly Ala Phe Thr Leu Leu Asp Asp Lys Ile Met
1130 1135 1140

Ile Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asn Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ser Pro Thr Ile Thr Tyr Ile Lys Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Glu Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp His Tyr Lys Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Asn Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu His Ile Arg

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1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe His Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Asp Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Asp Asn Lys Ile Ile Leu
1370 1375 1380

Asn His His Glu Ile Asn Phe Ser Gly Asp Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Ile Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro

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1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Phe Thr Leu Gln Asp Glu Lys Thr
1535 1540 1545

Ile Lys Leu Asn Gly Val His Leu Asp Glu Ser Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Lys Lys Gly Ser Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Val Asn Ile Lys Ser Ile Phe
1580 1585 1590

Val Asn Phe Leu Gln Ser Lys Ile Asn Phe Ile Leu Asp Ala Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Thr Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr

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1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Asn Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Ser Ala Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Thr Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asn Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Ile Leu

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1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Leu Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Glu
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met Tyr Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Ile
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Lys Lys Tyr Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Ile Glu Ile Asp Gly
2000 2005 2010

Lys Tyr Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Ser Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Ala Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Tyr Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr

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2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Val Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asn Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Glu Lys Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Glu Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Asp Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Ile Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Asn Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asp Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr

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2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Gln
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

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<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 721

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1 5 10 15

Arg Val Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

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Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Val Glu Ser Ala Thr Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Tyr Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Thr Gln
            180                 185                 190

Arg Glu Glu Asn Pro Asp Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Asp Ile Asp Glu Leu Asn Ser Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Val Thr Glu Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Gly Gly Glu Ser Phe Lys Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270
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Ile Ser Ala Leu Lys Glu Val Gly Gly Val Tyr Leu Ala Val Ala Met
275 280 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
290 295 300

Ser Val Thr Val Asp Phe Trp Glu Met Val Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Ala Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

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```
Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Lys Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Thr Val Val Asp Lys Glu Tyr
545                 550                 555                 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
            580                 585                 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
        595                 600                 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
    610                 615                 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625                 630                 635                 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
                645                 650                 655

Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser Thr
            660                 665                 670

Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
        675                 680                 685
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Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Val
    690                 695                 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Arg Val Lys Asp
705                 710                 715                 720

Lys Val Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
                725                 730                 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
            740                 745                 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
        755                 760                 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
    770                 775                 780

Lys Ile Ile Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785                 790                 795                 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
                805                 810                 815

Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
            820                 825                 830

Thr Gln Val Val Glu Gly Arg Ile Glu Glu Ala Lys Ser Leu Thr Ser
        835                 840                 845

Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser Ile
    850                 855                 860

Ser Asp Ala Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Glu Glu Ser
865                 870                 875                 880

His Phe Ile Ser Phe Glu Asp Ile Leu Glu Thr Asp Glu Gly Phe Ser
                885                 890                 895
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```
Ile Arg Phe Ile Asp Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Ala Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
        915                 920                 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Ala Thr His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Val  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050

Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
    1055                1060                1065

Asn Leu  Thr Ala Ala Thr Thr  Ala Ile Ile Thr Ser  Ser Leu Gly
    1070                1075                1080

Ile Ala  Ser Gly Phe Ser Ile  Leu Leu Val Pro Leu  Ala Gly Ile
    1085                1090                1095
```

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```
Ser Ala  Gly Ile Pro Ser Leu  Val Asn Asn Glu Leu  Ile Leu Arg
    1100                1105                1110

Asp Lys  Ala Thr Lys Val Val  Asp Tyr Phe Ser His  Ile Ser Leu
    1115                1120                1125

Ala Glu  Ser Glu Gly Ala Phe  Thr Ser Leu Asp Asp  Lys Ile Met
    1130                1135                1140

Met Pro  Gln Asp Asp Leu Val  Ile Ser Glu Ile Asp  Phe Asn Asn
    1145                1150                1155

Asn Ser  Ile Thr Leu Gly Lys  Cys Glu Ile Trp Arg  Met Glu Gly
    1160                1165                1170

Gly Ser  Gly His Thr Val Thr  Asp Asp Ile Asp His  Phe Phe Ser
    1175                1180                1185

Ala Pro  Ser Ile Thr Tyr Arg  Glu Pro His Leu Ser  Ile Tyr Asp
    1190                1195                1200

Val Leu  Glu Val Gln Lys Glu  Glu Leu Asp Leu Ser  Lys Asp Leu
    1205                1210                1215

Met Val  Leu Pro Asn Ala Pro  Asn Arg Val Phe Ala  Trp Glu Thr
    1220                1225                1230

Gly Trp  Thr Pro Gly Leu Arg  Ser Leu Glu Asn Asp  Gly Thr Lys
    1235                1240                1245

Leu Leu  Asp Arg Ile Arg Asp  Asn Tyr Glu Gly Glu  Phe Tyr Trp
    1250                1255                1260

Arg Tyr  Phe Ala Phe Ile Ala  Asp Ala Leu Ile Thr  Thr Leu Lys
    1265                1270                1275

Pro Arg  Tyr Glu Asp Thr Asn  Ile Arg Ile Asn Leu  Asp Ser Asn
    1280                1285                1290
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```
Thr Arg  Ser Phe Ile Val Pro  Val Ile Thr Thr Glu  Tyr Ile Arg
    1295                1300                1305

Glu Lys  Leu Ser Tyr Ser Phe  Tyr Gly Ser Gly Gly  Thr Tyr Ala
    1310                1315                1320

Leu Ser  Leu Ser Gln Tyr Asn  Met Asn Ile Asn Ile  Glu Leu Asn
    1325                1330                1335

Glu Asn  Asp Thr Trp Val Ile  Asp Val Asp Asn Val  Val Arg Asp
    1340                1345                1350

Val Thr  Ile Glu Ser Asp Lys  Ile Lys Lys Gly Asp  Leu Ile Glu
    1355                1360                1365

Asn Ile  Leu Ser Lys Leu Ser  Ile Glu Asp Asn Lys  Ile Ile Leu
    1370                1375                1380

Asp Asn  His Glu Ile Asn Phe  Ser Gly Thr Leu Asn  Gly Gly Asn
    1385                1390                1395

Gly Phe  Val Ser Leu Thr Phe  Ser Ile Leu Glu Gly  Ile Asn Ala
    1400                1405                1410

Val Ile  Glu Val Asp Leu Leu  Ser Lys Ser Tyr Lys  Val Leu Ile
    1415                1420                1425

Ser Gly  Glu Leu Lys Thr Leu  Met Ala Asn Ser Asn  Ser Val Gln
    1430                1435                1440

Gln Lys  Ile Asp Tyr Ile Gly  Leu Asn Ser Glu Leu  Gln Lys Asn
    1445                1450                1455

Ile Pro  Tyr Ser Phe Met Asp  Asp Lys Gly Lys Glu  Asn Gly Phe
    1460                1465                1470

Ile Asn  Cys Ser Thr Lys Glu  Gly Leu Phe Val Ser  Glu Leu Ser
    1475                1480                1485
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Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asn Ser Lys Pro
1490 1495 1500

Leu Phe Gly Tyr Cys Ser Asn Asp Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asp Val Ile Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Phe Thr Ile Gln Asp Glu Asn Thr
1535 1540 1545

Ile Lys Leu Asn Gly Val Tyr Leu Asp Glu Asn Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Lys Lys Gly Ser Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe
1580 1585 1590

Ile Asn Ser Leu Gln Ser Asn Thr Lys Leu Ile Leu Asp Thr Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Lys Asp Asn Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Lys Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

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Asp Ser Cys Val Asn Lys Val Ile Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Ile Tyr Glu Ala Asn Asn Thr Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Thr Asn Tyr Ile Ser Glu Lys Ile
1715 1720 1725

Asn Ile Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Ser Asp Phe Ile Leu Met Ser Thr Asp Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Thr Asn Val Phe Lys Gly Asn
1760 1765 1770

Thr Ile Ser Asp Lys Ile Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Ser Ile Asn Lys Val Ile Ser Thr Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Val Glu Gly Leu Leu Asn Tyr Asp Leu Gly Leu Ile Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Val Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Ile
1835 1840 1845

Lys Asn Leu Ile Thr Gly Phe Thr Thr Ile Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Asp Asn Gly Gly Ala Ala Ser Val Gly Glu Thr
1865 1870 1875

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Ile Ile Asp Gly Lys Asn Tyr Tyr Phe Ser Gln Asn Gly Val Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asp Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Thr Ile Asp Glu Asn Val Tyr Tyr Phe Gly
1925 1930 1935

Asp Asn Tyr Arg Ala Ala Ile Glu Trp Gln Thr Leu Asp Asp Glu
1940 1945 1950

Val Tyr Tyr Phe Ser Thr Asp Thr Gly Arg Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Asp Lys Phe Tyr Phe Asn Ser Asp Gly Ile
1970 1975 1980

Met Gln Lys Gly Phe Val Asn Ile Asn Asp Lys Thr Phe Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Ser Gly Tyr Thr Glu Ile Asp Gly
2000 2005 2010

Lys Tyr Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Ala Asp Gly Phe Lys Tyr Phe Ala His His Asp Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Ala Leu Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr
2060 2065 2070

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Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Ile Ser Ile Ile
2090 2095 2100

Asn Asp Gly Lys Tyr Tyr Phe Asn Asp Ser Gly Ile Met Gln Ile
2105 2110 2115

Gly Phe Val Thr Ile Asn Asn Glu Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Val Glu Ser Gly Met Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Glu Asn Gly Leu Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asp Pro Glu Thr Lys Lys Ala Tyr Lys Gly Ile Asn Val Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Asn Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Thr Phe Glu Asp Asn His Tyr Tyr Phe Asn Glu Asp Gly
2255 2260 2265

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Ile Met Gln Tyr Gly Tyr Leu Asn Ile Glu Asp Lys Thr Phe Tyr
2270 2275 2280

Phe Ser Glu Asp Gly Ile Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 722
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 722

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys

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50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
130 135 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145 150 155 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
165 170 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
180 185 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
195 200 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
210 215 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225 230 235 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg

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260 265 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Ala Val Ala Met
275 280 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
290 295 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu

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465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Phe Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545                 550                 555                 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
            580                 585                 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
        595                 600                 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
    610                 615                 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625                 630                 635                 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
                645                 650                 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
            660                 665                 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
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675 680 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
690 695 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705 710 715 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
725 730 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
740 745 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
755 760 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
770 775 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785 790 795 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
805 810 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
820 825 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
835 840 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
850 855 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865 870 875 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser

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                885                 890                 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
        915                 920                 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Ile  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050

Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
    1055                1060                1065

Asn Leu  Thr Thr Ala Thr Thr  Ala Ile Ile Thr Ser  Ser Leu Gly
    1070                1075                1080

Ile Ala  Ser Gly Phe Ser Ile  Leu Leu Val Pro Leu  Ala Gly Ile
```

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1085 1090 1095

Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg
1100 1105 1110

Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Val Ser Leu
1115 1120 1125

Val Glu Thr Glu Gly Val Phe Thr Leu Leu Asp Asp Lys Ile Met
1130 1135 1140

Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn

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1280 1285 1290

Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile Leu
1370 1375 1380

Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro

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1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Asp Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys Thr
1535 1540 1545

Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Arg Lys Gly Asn Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe
1580 1585 1590

Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile

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1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr

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1865 1870 1875

Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Tyr Lys Tyr Tyr Phe Asn Ser Asp Gly Val
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr

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2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly

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2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 723
<211> 2366
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 723

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Val Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

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Lys Asp Ile Asn Ser Leu Thr Asp Thr Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Ile
65 70 75 80

Glu Ile Leu Glu Leu Lys Asn Ser Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Ile Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
130 135 140

Ile Glu Ser Ala Ser Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145 150 155 160

Asn Asp Pro Glu Phe Asn His Thr Ala Phe Phe Arg Lys Arg Met Gln
165 170 175

Ile Ile Tyr Asp Lys Gln Gln Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
180 185 190

Lys Glu Glu Asn Pro Asp Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
195 200 205

Leu Ser Asn Glu Tyr Ser Lys Asp Ile Asp Glu Leu Asn Ala Tyr Ile
210 215 220

Glu Glu Ser Leu Asn Lys Val Thr Glu Asn Ser Gly Asn Asp Val Arg
225 230 235 240

Asn Phe Glu Glu Phe Lys Thr Gly Glu Val Phe Asn Leu Tyr Glu Gln
245 250 255

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Glu Leu Val Glu Arg Trp Asn Leu Ala Gly Ala Ser Asp Ile Leu Arg
            260                 265                 270

Val Ala Ile Leu Lys Asn Ile Gly Gly Val Tyr Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile His Pro Asp Leu Phe Lys Asp Ile Asn Lys Pro Asp
    290                 295                 300

Ser Val Lys Thr Ala Val Asp Trp Glu Glu Met Gln Leu Glu Ala Ile
305                 310                 315                 320

Met Lys His Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Lys His Phe Asp
                325                 330                 335

Thr Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
            340                 345                 350

Lys Ser Asp Lys Ser Glu Ile Phe Leu Pro Leu Gly Asp Ile Glu Val
        355                 360                 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Ala Lys Gly Ser Ile Ile Asn
    370                 375                 380

Gln Ala Leu Ile Ser Ala Lys Asp Ser Tyr Cys Ser Asp Leu Leu Ile
385                 390                 395                 400

Lys Gln Ile Gln Asn Arg Tyr Lys Ile Leu Asn Asp Thr Leu Gly Pro
                405                 410                 415

Ile Ile Ser Gln Gly Asn Asp Phe Asn Thr Thr Met Asn Asn Phe Gly
            420                 425                 430

Glu Ser Leu Gly Ala Ile Ala Asn Glu Glu Asn Ile Ser Phe Ile Ala
        435                 440                 445

Lys Ile Gly Ser Tyr Leu Arg Val Gly Phe Tyr Pro Glu Ala Asn Thr
    450                 455                 460
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Thr Ile Thr Leu Ser Gly Pro Thr Ile Tyr Ala Gly Ala Tyr Lys Asp
465 470 475 480

Leu Leu Thr Phe Lys Glu Met Ser Ile Asp Thr Ser Ile Leu Ser Ser
485 490 495

Glu Leu Arg Asn Phe Glu Phe Pro Lys Val Asn Ile Ser Gln Ala Thr
500 505 510

Glu Gln Glu Lys Asn Ser Leu Trp Gln Phe Asn Glu Glu Arg Ala Lys
515 520 525

Ile Gln Phe Glu Glu Tyr Lys Lys Asn Tyr Phe Glu Gly Ala Leu Gly
530 535 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Thr Val Thr Asp Lys Glu
545 550 555 560

Tyr Leu Leu Glu Lys Ile Ser Ser Ser Thr Lys Ser Ser Glu Arg Gly
565 570 575

Tyr Val His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
580 585 590

Ala Ala Cys Asn Leu Phe Ala Lys Asn Pro Tyr Asp Ser Ile Leu Phe
595 600 605

Gln Lys Asn Ile Glu Asp Ser Glu Val Ala Tyr Tyr Tyr Asn Pro Thr
610 615 620

Asp Ser Glu Ile Gln Glu Ile Asp Lys Tyr Arg Ile Pro Asp Arg Ile
625 630 635 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Ala
645 650 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser
660 665 670

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Ser Glu Ile Glu Thr Ala Ile Gly Leu Ala Lys Glu Asp Ile Ser Pro
675 680 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser
690 695 700

Val Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Arg Val Lys
705 710 715 720

Asp Lys Val Ser Glu Leu Met Pro Ser Met Ser Gln Asp Ser Ile Ile
725 730 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg
740 745 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
755 760 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
770 775 780

Asn Lys Ile Ile Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785 790 795 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu
805 810 815

Glu Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
820 825 830

Glu Thr Gln Val Val Glu Glu Arg Ile Glu Glu Ala Lys Ser Leu Thr
835 840 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser
850 855 860

Ile Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp
865 870 875 880

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```
Ser His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe
                885                 890                 895

Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
            900                 905                 910

Thr Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu
        915                 920                 925

Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
    930                 935                 940

Val Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn
945                 950                 955                 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu
                965                 970                 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
            980                 985                 990

Leu Phe Ser Thr Gly Leu Asn Thr  Ile Thr Asp Ala Ala  Lys Val Val
        995                 1000                1005

Glu Leu  Val Ser Thr Ala Leu  Asp Glu Thr Ile Asp  Leu Leu Pro
    1010                1015                1020

Thr Leu  Ser Glu Gly Leu Pro  Ile Ile Ala Thr Ile  Ile Asp Gly
    1025                1030                1035

Val Ser  Leu Gly Ala Ala Ile  Lys Glu Leu Ser Glu  Thr Ser Asp
    1040                1045                1050

Pro Leu  Leu Arg Gln Glu Ile  Glu Ala Lys Ile Gly  Ile Met Ala
    1055                1060                1065

Val Asn  Leu Thr Thr Ala Thr  Thr Ala Ile Ile Thr  Ser Ser Leu
    1070                1075                1080
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Gly Ile  Ala Ser Gly Phe Ser  Ile Leu Leu Val Pro  Leu Ala Gly
    1085                1090                1095

Ile Ser  Ala Gly Ile Pro Ser  Leu Val Asn Asn Glu  Leu Val Leu
    1100                1105                1110

Arg Asp  Lys Ala Thr Lys Val  Val Asp Tyr Phe Lys  His Val Ser
    1115                1120                1125

Leu Val  Glu Thr Glu Gly Val  Phe Thr Leu Leu Asp  Asp Lys Val
    1130                1135                1140

Met Met  Pro Gln Asp Asp Leu  Val Ile Ser Glu Ile  Asp Phe Asn
    1145                1150                1155

Asn Asn  Ser Ile Val Leu Gly  Lys Cys Glu Ile Trp  Arg Met Glu
    1160                1165                1170

Gly Gly  Ser Gly His Thr Val  Thr Asp Asp Ile Asp  His Phe Phe
    1175                1180                1185

Ser Ala  Pro Ser Ile Thr Tyr  Arg Glu Pro His Leu  Ser Ile Tyr
    1190                1195                1200

Asp Val  Leu Glu Val Gln Lys  Glu Glu Leu Asp Leu  Ser Lys Asp
    1205                1210                1215

Leu Met  Val Leu Pro Asn Ala  Pro Asn Arg Val Phe  Ala Trp Glu
    1220                1225                1230

Thr Gly  Trp Thr Pro Gly Leu  Arg Ser Leu Glu Asn  Asp Gly Thr
    1235                1240                1245

Lys Leu  Leu Asp Arg Ile Arg  Asp Asn Tyr Glu Gly  Glu Phe Tyr
    1250                1255                1260

Trp Arg  Tyr Phe Ala Phe Ile  Ala Asp Ala Leu Ile  Thr Thr Leu
    1265                1270                1275
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Lys Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser
1280 1285 1290

Asn Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile
1295 1300 1305

Arg Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr
1310 1315 1320

Ala Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu
1325 1330 1335

Ser Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg
1340 1345 1350

Asp Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile
1355 1360 1365

Glu Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile
1370 1375 1380

Leu Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser
1385 1390 1395

Asn Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn
1400 1405 1410

Ala Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu
1415 1420 1425

Ile Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile
1430 1435 1440

Gln Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys
1445 1450 1455

Asn Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly
1460 1465 1470

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Phe Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu
1475 1480 1485

Pro Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys
1490 1495 1500

Pro Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val
1505 1510 1515

Ile Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys
1520 1525 1530

Asp Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys
1535 1540 1545

Thr Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala
1550 1555 1560

Glu Ile Leu Lys Phe Met Asn Arg Lys Gly Ser Thr Asn Thr Ser
1565 1570 1575

Asp Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile
1580 1585 1590

Phe Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala
1595 1600 1605

Asn Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe
1610 1615 1620

Ile Cys Asp Glu Asn Asn Asn Ile Gln Pro Tyr Phe Ile Lys Phe
1625 1630 1635

Asn Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln
1640 1645 1650

Asn Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp
1655 1660 1665

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Ile Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly
1670 1675 1680

Ile Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr
1685 1690 1695

Thr Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr
1700 1705 1710

Tyr Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys
1715 1720 1725

Ile Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser
1730 1735 1740

Asn Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn
1745 1750 1755

Lys Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp
1760 1765 1770

Lys Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln
1775 1780 1785

Asp Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr
1790 1795 1800

Tyr Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu
1805 1810 1815

Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser
1820 1825 1830

Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro
1835 1840 1845

Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys
1850 1855 1860

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Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu
1865 1870 1875

Thr Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val
1880 1885 1890

Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
1895 1900 1905

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile
1910 1915 1920

Asp Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe
1925 1930 1935

Glu Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly
1940 1945 1950

Glu Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly
1955 1960 1965

Leu Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly
1970 1975 1980

Val Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr
1985 1990 1995

Phe Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp
2000 2005 2010

Gly Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly
2015 2020 2025

Val Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn
2030 2035 2040

Glu Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly
2045 2050 2055

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```
Ile Leu  Asn Phe Asn Asn Lys  Ile Tyr Tyr Phe Asp  Asp Ser Phe
    2060                2065                2070

Thr Ala  Val Val Gly Trp Lys  Asp Leu Glu Asp Gly  Ser Lys Tyr
    2075                2080                2085

Tyr Phe  Asp Glu Asp Thr Ala  Glu Ala Tyr Ile Gly  Leu Ser Leu
    2090                2095                2100

Ile Asn  Asp Gly Gln Tyr Tyr  Phe Asn Asp Asp Gly  Ile Met Gln
    2105                2110                2115

Val Gly  Phe Val Thr Ile Asn  Asp Lys Val Phe Tyr  Phe Ser Asp
    2120                2125                2130

Ser Gly  Ile Ile Glu Ser Gly  Val Gln Asn Ile Asp  Asp Asn Tyr
    2135                2140                2145

Phe Tyr  Ile Asp Asp Asn Gly  Ile Val Gln Ile Gly  Val Phe Asp
    2150                2155                2160

Thr Ser  Asp Gly Tyr Lys Tyr  Phe Ala Pro Ala Asn  Thr Val Asn
    2165                2170                2175

Asp Asn  Ile Tyr Gly Gln Ala  Val Glu Tyr Ser Gly  Leu Val Arg
    2180                2185                2190

Val Gly  Glu Asp Val Tyr Tyr  Phe Gly Glu Thr Tyr  Thr Ile Glu
    2195                2200                2205

Thr Gly  Trp Ile Tyr Asp Met  Glu Asn Glu Ser Asp  Lys Tyr Tyr
    2210                2215                2220

Phe Asp  Pro Glu Thr Lys Lys  Ala Cys Lys Gly Ile  Asn Leu Ile
    2225                2230                2235

Asp Asp  Ile Lys Tyr Tyr Phe  Asp Glu Lys Gly Ile  Met Arg Thr
    2240                2245                2250
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Gly Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn
2255 2260 2265

Gly Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe
2270 2275 2280

Tyr Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr
2285 2290 2295

Pro Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu
2300 2305 2310

Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu
2315 2320 2325

Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr
2330 2335 2340

Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp
2345 2350 2355

Thr Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 724
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 724

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu

```
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
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245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
260 265 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Ala Val Ala Met
275 280 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
290 295 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr

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    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545                 550                 555                 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
            580                 585                 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
        595                 600                 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
    610                 615                 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625                 630                 635                 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
                645                 650                 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
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660 665 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
675 680 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
690 695 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Lys Val Lys Asp
705 710 715 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
725 730 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
740 745 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
755 760 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
770 775 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785 790 795 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
805 810 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
820 825 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
835 840 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
850 855 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser

865 870 875 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
885 890 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
900 905 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
915 920 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
930 935 940

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945 950 955 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
965 970 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
980 985 990

Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp Ala Ala Lys Val Val Glu
995 1000 1005

Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu Pro Thr
1010 1015 1020

Leu Ser Glu Gly Leu Pro Ile Ile Ala Thr Ile Ile Asp Gly Val
1025 1030 1035

Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp Pro
1040 1045 1050

Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala Val
1055 1060 1065

Asn Leu Thr Thr Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu Gly

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1070 1075 1080

Val Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile
1085 1090 1095

Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg
1100 1105 1110

Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Val Ser Leu
1115 1120 1125

Val Glu Thr Glu Gly Val Phe Thr Leu Leu Asp Asp Lys Ile Met
1130 1135 1140

Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys

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1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile Leu
1370 1375 1380

Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe

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1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys Thr
1535 1540 1545

Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Arg Lys Gly Asn Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe
1580 1585 1590

Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile

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1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr

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1850 1855 1860

Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Tyr Lys Tyr Tyr Phe Asn Ser Asp Gly Val
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile

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2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly

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2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 725
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 725

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

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```
Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240
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Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445
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Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Thr Phe Asp Asp Ala Arg Ala Lys Val
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
530 535 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545 550 555 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
565 570 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
580 585 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Ile Leu Phe Gln
595 600 605

Lys Asn Ile Glu Asn Ser Glu Val Ala Tyr Tyr Tyr Asn Pro Gly Asp
610 615 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Arg Ile Pro Ser Ile Ile Ser
625 630 635 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
645 650 655

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```
Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser Thr
            660                 665                 670

Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Ser Lys
        675                 680                 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
    690                 695                 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705                 710                 715                 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
                725                 730                 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Asn Glu Gly Arg Arg Glu
            740                 745                 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
        755                 760                 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
    770                 775                 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785                 790                 795                 800

Gln Glu Ile Arg Asn Asn Ser Asn Leu Ser Asp Ile Glu Leu Glu Glu
                805                 810                 815

Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
            820                 825                 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
        835                 840                 845

Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser Ile
    850                 855                 860
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Ser Asp Ser Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Asp Asp Ser
865                 870                 875                 880

His Phe Ile Ser Phe Glu Asp Ile Ser Lys Thr Glu Asp Gly Phe Ser
                885                 890                 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Glu Ile Phe Ser Glu Tyr Ala Asn His Ile Glu Arg Glu Ile
        915                 920                 925

Ser Asn Ile Lys Asp Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Ala Ile His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Gly Tyr Ser Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Val  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050

Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
    1055                1060                1065
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Asn Leu Thr Ala Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu Gly
1070 1075 1080

Ile Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile
1085 1090 1095

Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg
1100 1105 1110

Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Ile Ser Leu
1115 1120 1125

Val Glu Thr Glu Gly Ala Phe Thr Leu Leu Asp Asp Lys Ile Met
1130 1135 1140

Ile Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asn Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ser Pro Thr Ile Thr Tyr Ile Lys Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Glu Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp His Tyr Lys Gly Glu Phe Tyr Trp
1250 1255 1260

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Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Asn Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu His Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe His Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Asp Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Asp Asn Lys Ile Ile Leu
1370 1375 1380

Asn His His Glu Ile Asn Phe Ser Gly Asp Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Ile Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

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```
Ile Pro  Tyr Ser Phe Val Asp  Ser Glu Gly Lys Glu  Asn Gly Phe
    1460                1465                1470

Ile Asn  Gly Ser Thr Lys Glu  Gly Leu Phe Val Ser  Glu Leu Pro
    1475                1480                1485

Asp Val  Val Leu Ile Ser Lys  Val Tyr Met Asp Asp  Ser Lys Pro
    1490                1495                1500

Ser Phe  Gly Tyr Tyr Ser Asn  Asn Leu Lys Asp Val  Lys Val Ile
    1505                1510                1515

Thr Lys  Asp Asn Val Asn Ile  Leu Thr Gly Tyr Tyr  Leu Lys Asp
    1520                1525                1530

Asp Ile  Lys Ile Ser Leu Ser  Phe Thr Leu Gln Asp  Glu Lys Thr
    1535                1540                1545

Ile Lys  Leu Asn Gly Val His  Leu Asp Glu Ser Gly  Val Ala Glu
    1550                1555                1560

Ile Leu  Lys Phe Met Asn Lys  Lys Gly Ser Thr Asn  Thr Ser Asp
    1565                1570                1575

Ser Leu  Met Ser Phe Leu Glu  Ser Val Asn Ile Lys  Ser Ile Phe
    1580                1585                1590

Val Asn  Phe Leu Gln Ser Lys  Ile Asn Phe Ile Leu  Asp Ala Asn
    1595                1600                1605

Phe Ile  Ile Ser Gly Thr Thr  Ser Ile Gly Gln Phe  Glu Phe Ile
    1610                1615                1620

Cys Asp  Glu Asn Asp Asn Ile  Gln Pro Tyr Phe Ile  Lys Phe Asn
    1625                1630                1635

Thr Leu  Glu Thr Thr Tyr Thr  Leu Tyr Val Gly Asn  Arg Gln Asn
    1640                1645                1650
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```
Met Ile  Val Glu Pro Asn Tyr  Asp Leu Asp Asp Ser  Gly Asp Ile
    1655                1660                1665

Ser Ser  Thr Val Ile Asn Phe  Ser Gln Lys Tyr Leu  Tyr Gly Ile
    1670                1675                1680

Asp Ser  Cys Val Asn Lys Val  Val Ile Ser Pro Asn  Ile Tyr Thr
    1685                1690                1695

Asp Glu  Ile Asn Ile Thr Pro  Val Tyr Glu Thr Asn  Asn Asn Tyr
    1700                1705                1710

Pro Glu  Val Ile Val Leu Asp  Ala Asn Tyr Ile Asn  Glu Lys Ile
    1715                1720                1725

Asn Val  Asn Ile Asn Asp Leu  Ser Ile Arg Tyr Val  Trp Ser Asn
    1730                1735                1740

Asp Gly  Asn Asp Phe Ile Leu  Met Ser Thr Ser Glu  Glu Asn Lys
    1745                1750                1755

Val Ser  Gln Val Lys Ile Arg  Phe Val Asn Val Phe  Lys Asp Lys
    1760                1765                1770

Thr Leu  Ala Asn Lys Leu Ser  Phe Asn Phe Ser Asp  Lys Gln Asp
    1775                1780                1785

Val Pro  Val Ser Glu Ile Ile  Ser Ala Phe Thr Pro  Ser Tyr Tyr
    1790                1795                1800

Glu Asp  Gly Leu Ile Gly Tyr  Asp Leu Gly Leu Val  Ser Leu Tyr
    1805                1810                1815

Asn Glu  Lys Phe Tyr Ile Asn  Asn Phe Gly Met Met  Val Ser Gly
    1820                1825                1830

Leu Ile  Tyr Ile Asn Asp Ser  Leu Tyr Tyr Phe Lys  Pro Pro Val
    1835                1840                1845
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```
Asn Asn  Leu Ile Thr Gly Phe  Val Thr Val Gly Asp  Asp Lys Tyr
    1850                1855                1860

Tyr Phe  Asn Pro Thr Asn Gly  Gly Ala Ala Ser Ile  Gly Glu Thr
    1865                1870                1875

Ile Ile  Asn Asp Lys Asn Tyr  Tyr Phe Asn Gln Ser  Gly Ile Leu
    1880                1885                1890

Gln Thr  Gly Val Phe Ser Thr  Glu Asp Gly Leu Lys  Tyr Phe Ala
    1895                1900                1905

Pro Ala  Asn Thr Leu Asp Glu  Asn Leu Glu Gly Glu  Ala Ile Asp
    1910                1915                1920

Phe Thr  Gly Lys Leu Ile Ile  Asp Glu Asn Ile Tyr  Tyr Phe Glu
    1925                1930                1935

Asp Asn  Tyr Arg Gly Ala Val  Glu Trp Lys Glu Leu  Asp Gly Glu
    1940                1945                1950

Met Tyr  Tyr Phe Ser Pro Glu  Thr Gly Lys Ala Phe  Lys Gly Leu
    1955                1960                1965

Asn Gln  Ile Gly Asp Asp Lys  Tyr Tyr Phe Asn Ser  Asp Gly Ile
    1970                1975                1980

Met Gln  Lys Gly Phe Val Ser  Ile Asn Asp Lys Lys  Tyr Tyr Phe
    1985                1990                1995

Asp Asp  Ser Gly Val Met Lys  Val Gly Tyr Ile Glu  Ile Asp Gly
    2000                2005                2010

Lys Tyr  Phe Tyr Phe Ala Glu  Asn Gly Glu Met Gln  Ile Gly Val
    2015                2020                2025

Phe Asn  Thr Ser Asp Gly Phe  Lys Tyr Phe Ala His  His Asn Glu
    2030                2035                2040
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```
Asp Leu  Gly Asn Glu Glu Gly  Glu Ala Ile Ser Tyr  Ser Gly Ile
    2045                2050                2055

Leu Asn  Phe Asn Asn Lys Ile  Tyr Tyr Phe Asp Tyr  Ser Phe Thr
    2060                2065                2070

Ala Val  Val Gly Trp Lys Asp  Leu Glu Asp Gly Ser  Lys Tyr Tyr
    2075                2080                2085

Phe Asp  Glu Asp Thr Ala Glu  Ala Tyr Val Gly Leu  Ser Leu Ile
    2090                2095                2100

Asn Asp  Gly Gln Tyr Tyr Phe  Asn Asp Asp Gly Ile  Met Gln Val
    2105                2110                2115

Gly Phe  Val Thr Ile Asn Asn  Lys Val Phe Tyr Phe  Ser Asp Ser
    2120                2125                2130

Gly Ile  Ile Glu Ser Gly Val  Gln Asn Ile Asp Asp  Asn Tyr Phe
    2135                2140                2145

Tyr Ile  Asp Glu Lys Gly Ile  Val Gln Ile Gly Val  Phe Asp Thr
    2150                2155                2160

Ser Asp  Glu Tyr Lys Tyr Phe  Ala Pro Ala Asn Thr  Val Asn Asp
    2165                2170                2175

Asn Ile  Tyr Gly Gln Ala Val  Asp Tyr Ser Gly Leu  Val Arg Val
    2180                2185                2190

Gly Glu  Asp Ile Tyr Tyr Phe  Gly Glu Thr Tyr Thr  Ile Glu Thr
    2195                2200                2205

Gly Trp  Ile Tyr Asp Met Glu  Asn Glu Ser Asp Lys  Tyr Tyr Phe
    2210                2215                2220

Asn Pro  Glu Thr Lys Lys Ala  Cys Lys Gly Ile Asn  Leu Ile Asp
    2225                2230                2235
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Asp Ile Lys Tyr Tyr Phe Asp Glu Asn Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asp Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Gln
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 726
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 726

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu

```
            20                  25                  30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
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225 230 235 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
260 265 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Ala Val Ala Met
275 280 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
290 295 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu

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435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
530 535 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545 550 555 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
565 570 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
580 585 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
595 600 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
610 615 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625 630 635 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu

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645 650 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
660 665 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
675 680 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
690 695 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705 710 715 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
725 730 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
740 745 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
755 760 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
770 775 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785 790 795 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
805 810 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
820 825 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
835 840 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile

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    850                 855                 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865                 870                 875                 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
                885                 890                 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
        915                 920                 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Ile  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050

Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
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1055 1060 1065

Asn Leu Thr Thr Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu Gly
1070 1075 1080

Ile Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile
1085 1090 1095

Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg
1100 1105 1110

Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Val Ser Leu
1115 1120 1125

Val Glu Thr Glu Gly Val Phe Thr Leu Leu Asp Asp Lys Ile Met
1130 1135 1140

Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr Trp

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1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile Leu
1370 1375 1380

Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn

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1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys Thr
1535 1540 1545

Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Arg Lys Gly Asn Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe
1580 1585 1590

Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn

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1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val

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1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Val
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu

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2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp

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2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

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<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 727

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

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Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
            20                  25                  30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220
```

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```
Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430
```

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Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Thr Phe Asp Asp Ala Arg Ala Lys Val
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
530 535 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545 550 555 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
565 570 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
580 585 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Ile Leu Phe Gln
595 600 605

Lys Asn Ile Glu Asn Ser Glu Val Ala Tyr Tyr Tyr Asn Pro Gly Asp
610 615 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Arg Ile Pro Ser Ile Ile Ser
625 630 635 640

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```
Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
                645                 650                 655

Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser Thr
            660                 665                 670

Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Ser Lys
        675                 680                 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
    690                 695                 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705                 710                 715                 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
                725                 730                 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Asn Glu Gly Arg Arg Glu
            740                 745                 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
        755                 760                 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
    770                 775                 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785                 790                 795                 800

Gln Glu Ile Arg Asn Asn Ser Asn Leu Ser Asp Ile Glu Leu Glu Glu
                805                 810                 815

Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
            820                 825                 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
        835                 840                 845
```

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```
Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser Ile
    850                 855                 860

Ser Asp Ser Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Asp Asp Ser
865                 870                 875                 880

His Phe Ile Ser Phe Glu Asp Ile Ser Lys Thr Glu Asp Gly Phe Ser
                885                 890                 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Glu Ile Phe Ser Glu Tyr Ala Asn His Ile Glu Arg Glu Ile
        915                 920                 925

Ser Asn Ile Lys Asp Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Ala Ile His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Gly Tyr Ser Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Val  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050
```

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Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala Val
1055 1060 1065

Asn Leu Thr Ala Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu Gly
1070 1075 1080

Ile Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile
1085 1090 1095

Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg
1100 1105 1110

Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Ile Ser Leu
1115 1120 1125

Val Glu Thr Glu Gly Ala Phe Thr Leu Leu Asp Asp Lys Ile Met
1130 1135 1140

Ile Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asn Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ser Pro Thr Ile Thr Tyr Ile Lys Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Glu Gly Thr Lys
1235 1240 1245

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```
Leu Leu  Asp Arg Ile Arg Asp  His Tyr Lys Gly Glu  Phe Tyr Trp
    1250                1255                1260

Arg Tyr  Phe Ala Phe Ile Ala  Asp Ala Leu Ile Thr  Thr Leu Lys
    1265                1270                1275

Pro Arg  Tyr Glu Asp Thr Asn  Ile Arg Ile Asn Leu  Asp Ser Asn
    1280                1285                1290

Asn Arg  Ser Phe Ile Val Pro  Ile Ile Thr Thr Glu  His Ile Arg
    1295                1300                1305

Glu Lys  Leu Ser Tyr Ser Phe  His Gly Ser Gly Gly  Thr Tyr Ala
    1310                1315                1320

Leu Ser  Leu Ser Gln Tyr Asn  Met Gly Ile Asn Ile  Glu Leu Ser
    1325                1330                1335

Glu Ser  Asp Val Trp Ile Ile  Asp Val Asp Asn Val  Val Arg Asp
    1340                1345                1350

Val Thr  Ile Asp Ser Asp Lys  Ile Lys Lys Gly Asp  Leu Ile Glu
    1355                1360                1365

Gly Ile  Leu Ser Thr Leu Ser  Ile Glu Asp Asn Lys  Ile Ile Leu
    1370                1375                1380

Asn His  His Glu Ile Asn Phe  Ser Gly Asp Val Asn  Gly Ser Asn
    1385                1390                1395

Gly Phe  Ile Ser Leu Thr Phe  Ser Ile Leu Glu Gly  Ile Asn Ala
    1400                1405                1410

Ile Ile  Glu Val Asp Leu Leu  Ser Lys Ser Tyr Lys  Leu Leu Ile
    1415                1420                1425

Ser Gly  Glu Leu Lys Ile Leu  Met Leu Asn Ser Asn  His Ile Gln
    1430                1435                1440
```

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```
Gln Lys  Ile Asp Tyr Ile Gly  Phe Asn Ser Glu Leu  Gln Lys Asn
    1445                1450                1455

Ile Pro  Tyr Ser Phe Val Asp  Ser Glu Gly Lys Glu  Asn Gly Phe
    1460                1465                1470

Ile Asn  Gly Ser Thr Lys Glu  Gly Leu Phe Val Ser  Glu Leu Pro
    1475                1480                1485

Asp Val  Val Leu Ile Ser Lys  Val Tyr Met Asp Asp  Ser Lys Pro
    1490                1495                1500

Ser Phe  Gly Tyr Tyr Ser Asn  Asn Leu Lys Asp Val  Lys Val Ile
    1505                1510                1515

Thr Lys  Asp Asn Val Asn Ile  Leu Thr Gly Tyr Tyr  Leu Lys Asp
    1520                1525                1530

Asp Ile  Lys Ile Ser Leu Ser  Phe Thr Leu Gln Asp  Glu Lys Thr
    1535                1540                1545

Ile Lys  Leu Asn Gly Val His  Leu Asp Glu Ser Gly  Val Ala Glu
    1550                1555                1560

Ile Leu  Lys Phe Met Asn Lys  Lys Gly Ser Thr Asn  Thr Ser Asp
    1565                1570                1575

Ser Leu  Met Ser Phe Leu Glu  Ser Val Asn Ile Lys  Ser Ile Phe
    1580                1585                1590

Val Asn  Phe Leu Gln Ser Lys  Ile Asn Phe Ile Leu  Asp Ala Asn
    1595                1600                1605

Phe Ile  Ile Ser Gly Thr Thr  Ser Ile Gly Gln Phe  Glu Phe Ile
    1610                1615                1620

Cys Asp  Glu Asn Asp Asn Ile  Gln Pro Tyr Phe Ile  Lys Phe Asn
    1625                1630                1635
```

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Thr Leu Glu Thr Thr Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Asn Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Ser Ala Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

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```
Leu Ile  Tyr Ile Asn Asp Ser  Leu Tyr Tyr Phe Lys  Pro Pro Val
    1835                 1840                 1845

Asn Asn  Leu Ile Thr Gly Phe  Val Thr Val Gly Asp  Asp Lys Tyr
    1850                 1855                 1860

Tyr Phe  Asn Pro Thr Asn Gly  Gly Ala Ala Ser Ile  Gly Glu Thr
    1865                 1870                 1875

Ile Ile  Asn Asp Lys Asn Tyr  Tyr Phe Asn Gln Ser  Gly Ile Leu
    1880                 1885                 1890

Gln Thr  Gly Val Phe Ser Thr  Glu Asp Gly Leu Lys  Tyr Phe Ala
    1895                 1900                 1905

Pro Ala  Asn Thr Leu Asp Glu  Asn Leu Glu Gly Glu  Ala Ile Asp
    1910                 1915                 1920

Phe Thr  Gly Lys Leu Ile Ile  Asp Glu Asn Ile Tyr  Tyr Phe Glu
    1925                 1930                 1935

Asp Asn  Tyr Arg Gly Ala Val  Glu Trp Lys Glu Leu  Asp Gly Glu
    1940                 1945                 1950

Met Tyr  Tyr Phe Ser Pro Glu  Thr Gly Lys Ala Phe  Lys Gly Leu
    1955                 1960                 1965

Asn Gln  Ile Gly Asp Asp Lys  Tyr Tyr Phe Asn Ser  Asp Gly Ile
    1970                 1975                 1980

Met Gln  Lys Gly Phe Val Ser  Ile Asn Asp Lys Lys  Tyr Tyr Phe
    1985                 1990                 1995

Asp Asp  Ser Gly Val Met Lys  Val Gly Tyr Ile Glu  Ile Asp Gly
    2000                 2005                 2010

Lys Tyr  Phe Tyr Phe Ala Glu  Asn Gly Glu Met Gln  Ile Gly Val
    2015                 2020                 2025
```

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Phe Asn Thr Ser Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Ala Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Tyr Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Val Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asn Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Glu Lys Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Glu Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Asp Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Ile Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

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Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Asn Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asp Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Gln
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 728
<211> 2366
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 728

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe

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1               5                   10                  15

Arg Val Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
            20                  25                  30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Thr Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Ile Leu Glu Leu Lys Asn Ser Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Ile Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Ile Glu Ser Ala Ser Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Glu Phe Asn His Thr Ala Phe Phe Arg Lys Arg Met Gln
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Gln Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Lys Glu Glu Asn Pro Asp Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Asp Ile Asp Glu Leu Asn Ala Tyr Ile
```

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210 215 220

Glu Glu Ser Leu Asn Lys Val Thr Glu Asn Ser Gly Asn Asp Val Arg
225 230 235 240

Asn Phe Glu Glu Phe Lys Thr Gly Glu Val Phe Asn Leu Tyr Glu Gln
245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Gly Ala Ser Asp Ile Leu Arg
260 265 270

Val Ala Ile Leu Lys Asn Ile Gly Gly Val Tyr Leu Ala Val Ala Met
275 280 285

Leu Pro Gly Ile His Pro Asp Leu Phe Lys Asp Ile Asn Lys Pro Asp
290 295 300

Ser Val Lys Thr Ala Val Asp Trp Glu Glu Met Gln Leu Glu Ala Ile
305 310 315 320

Met Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Lys His Phe Asp
325 330 335

Thr Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
340 345 350

Lys Ser Asp Lys Ser Glu Ile Phe Leu Pro Leu Gly Asp Ile Glu Val
355 360 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Ala Lys Gly Ser Ile Ile Asn
370 375 380

Gln Ala Leu Ile Ser Ala Lys Asp Ser Tyr Cys Ser Asp Leu Leu Ile
385 390 395 400

Lys Gln Ile Gln Asn Arg Tyr Lys Ile Leu Asn Asp Thr Leu Gly Pro
405 410 415

Ile Ile Ser Gln Gly Asn Asp Phe Asn Thr Thr Met Asn Asn Phe Gly

420 425 430

Glu Ser Leu Gly Ala Ile Ala Asn Glu Glu Asn Ile Ser Phe Ile Ala
435 440 445

Lys Ile Gly Ser Tyr Leu Arg Val Gly Phe Tyr Pro Glu Ala Asn Thr
450 455 460

Thr Ile Thr Leu Ser Gly Pro Thr Ile Tyr Ala Gly Ala Tyr Lys Asp
465 470 475 480

Leu Leu Thr Phe Lys Glu Met Ser Ile Asp Thr Ser Ile Leu Ser Ser
485 490 495

Glu Leu Arg Asn Phe Glu Phe Pro Lys Val Asn Ile Ser Gln Ala Thr
500 505 510

Glu Gln Glu Lys Asn Ser Leu Trp Gln Phe Asn Glu Glu Arg Ala Lys
515 520 525

Ile Gln Phe Glu Glu Tyr Lys Lys Asn Tyr Phe Glu Gly Ala Leu Gly
530 535 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Thr Val Ile Asp Lys Glu
545 550 555 560

Tyr Leu Leu Glu Lys Ile Ser Ser Ser Thr Lys Ser Ser Glu Arg Gly
565 570 575

Tyr Val His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
580 585 590

Ala Ala Cys Asn Leu Phe Ala Lys Asn Pro Tyr Asp Ser Ile Leu Phe
595 600 605

Gln Lys Asn Ile Glu Asp Ser Glu Val Ala Tyr Tyr Tyr Asn Pro Thr
610 615 620

Asp Ser Glu Ile Gln Glu Ile Asp Lys Tyr Arg Ile Pro Asp Arg Ile

625 630 635 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Leu Ile Gly His Gly Lys Ala
645 650 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser
660 665 670

Ser Glu Ile Glu Thr Ile Ile Asp Leu Ala Lys Ala Asp Ile Ser Pro
675 680 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser
690 695 700

Val Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Arg Val Lys
705 710 715 720

Asp Lys Val Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
725 730 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg
740 745 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
755 760 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
770 775 780

Asn Lys Ile Ile Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785 790 795 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu
805 810 815

Glu Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
820 825 830

Glu Thr Gln Val Val Glu Glu Arg Ile Glu Glu Ala Lys Ser Leu Thr

835 840 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser
850 855 860

Ile Ser Asp Ala Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Glu Glu
865 870 875 880

Ser His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe
885 890 895

Ser Ile Arg Phe Ile Asp Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
900 905 910

Thr Glu Lys Ala Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu
915 920 925

Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
930 935 940

Val Lys Lys Val Asn Leu Asp Ala Thr His Glu Val Asn Thr Leu Asn
945 950 955 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu
965 970 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
980 985 990

Leu Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp Ala Ala Lys Val Val
995 1000 1005

Glu Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu Pro
1010 1015 1020

Thr Leu Ser Glu Gly Leu Pro Val Ile Ala Thr Ile Ile Asp Gly
1025 1030 1035

Val Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp

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1040 1045 1050

Pro Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala
1055 1060 1065

Val Asn Leu Thr Ala Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu
1070 1075 1080

Gly Ile Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly
1085 1090 1095

Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile Leu
1100 1105 1110

Arg Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Ser His Ile Ser
1115 1120 1125

Leu Ala Glu Ser Glu Gly Ala Phe Thr Ser Leu Asp Asp Lys Ile
1130 1135 1140

Met Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn
1145 1150 1155

Asn Asn Ser Ile Thr Leu Gly Lys Cys Glu Ile Trp Arg Met Glu
1160 1165 1170

Gly Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe
1175 1180 1185

Ser Ser Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr
1190 1195 1200

Asp Val Leu Glu Val Lys Lys Glu Glu Leu Asp Leu Ser Lys Asp
1205 1210 1215

Leu Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Gly Trp Glu
1220 1225 1230

Thr Gly Trp Thr Pro Gly Leu Arg Gly Leu Glu Asn Asp Gly Thr

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1235 1240 1245

Lys Leu Leu Asp Arg Ile Arg Asp Gln Tyr Glu Gly Gln Phe Tyr
1250 1255 1260

Trp Arg Phe Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu
1265 1270 1275

Lys Pro Arg Tyr Glu Asp Thr Asn Val Arg Ile Ser Leu Asp Ser
1280 1285 1290

Asn Thr Arg Ser Phe Ile Val Pro Val Ile Thr Thr Glu Tyr Ile
1295 1300 1305

Arg Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr
1310 1315 1320

Ala Leu Ser Leu Ser Gln Tyr Asn Met Asn Ile Asn Ile Glu Leu
1325 1330 1335

Asn Glu Asn Asp Thr Trp Val Ile Asp Val Asp Asn Val Val Arg
1340 1345 1350

Ser Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile
1355 1360 1365

Glu Asn Ile Leu Ser Lys Leu Ser Ile Glu Asp Asn Lys Ile Ile
1370 1375 1380

Leu Asp Asn His Glu Ile Asn Phe Ser Gly Thr Leu Asn Gly Gly
1385 1390 1395

Asn Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn
1400 1405 1410

Ala Val Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Val Leu
1415 1420 1425

Ile Ser Gly Glu Leu Lys Thr Leu Met Ala Asn Ser Asn Ser Val

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1430 1435 1440

Gln Gln Lys Ile Asp Tyr Ile Gly Leu Asn Ser Glu Leu Gln Lys
1445 1450 1455

Asn Ile Pro Tyr Ser Phe Met Asp Asp Lys Gly Lys Glu Asn Gly
1460 1465 1470

Phe Ile Asn Cys Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu
1475 1480 1485

Ser Asp Val Val Leu Ile Ile Lys Val Tyr Met Asp Asn Ser Lys
1490 1495 1500

Pro Pro Phe Gly Tyr Tyr Ser Asn Asp Leu Lys Asp Val Lys Ala
1505 1510 1515

Ile Thr Lys Asp Asp Val Ile Ile Leu Thr Gly Tyr Tyr Leu Lys
1520 1525 1530

Asp Asp Ile Lys Ile Ser Leu Ser Phe Thr Ile Gln Asp Lys Asn
1535 1540 1545

Thr Ile Lys Leu Asn Gly Val Tyr Leu Asp Glu Asn Gly Val Ala
1550 1555 1560

Glu Ile Leu Lys Phe Met Asn Lys Lys Gly Ser Thr Asn Thr Ser
1565 1570 1575

Asp Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile
1580 1585 1590

Phe Ile Lys Ser Leu Lys Ser Asn Ala Lys Leu Ile Leu Asp Thr
1595 1600 1605

Asn Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe
1610 1615 1620

Ile Cys Asp Lys Asp Asn Asn Ile Gln Pro Tyr Phe Ile Lys Phe

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1625 1630 1635

Asn Thr Leu Glu Thr Lys Tyr Thr Leu Tyr Val Gly Asn Arg Gln
1640 1645 1650

Asn Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp
1655 1660 1665

Ile Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly
1670 1675 1680

Ile Asp Ser Cys Val Asn Lys Val Ile Ile Ser Pro Asn Ile Tyr
1685 1690 1695

Thr Asp Glu Ile Asn Ile Thr Pro Ile Tyr Glu Ala Asn Asn Thr
1700 1705 1710

Tyr Pro Glu Val Ile Val Leu Asp Thr Asn Tyr Ile Ser Glu Lys
1715 1720 1725

Ile Asn Ile Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser
1730 1735 1740

Asn Asp Gly Ser Asp Phe Ile Leu Met Ser Thr Asp Glu Glu Asn
1745 1750 1755

Lys Val Ser Gln Val Lys Ile Arg Phe Thr Asn Val Phe Lys Gly
1760 1765 1770

Asn Thr Ile Ser Asp Lys Ile Ser Phe Asn Phe Ser Asp Lys Gln
1775 1780 1785

Asp Val Ser Ile Asn Lys Ile Ile Ser Thr Phe Thr Pro Ser Tyr
1790 1795 1800

Tyr Val Glu Gly Leu Leu Asn Tyr His Leu Gly Leu Ile Ser Leu
1805 1810 1815

Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser

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1820 1825 1830

Gly Leu Val Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro
1835 1840 1845

Ile Lys Asn Leu Ile Thr Gly Phe Thr Thr Ile Gly Asp Asp Lys
1850 1855 1860

Tyr Tyr Phe Asn Pro Asp Asn Gly Gly Ala Ala Ser Val Gly Glu
1865 1870 1875

Thr Ile Ile Asp Gly Lys Asn Tyr Tyr Phe Ser Pro Asn Gly Val
1880 1885 1890

Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
1895 1900 1905

Ala Pro Ala Asp Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile
1910 1915 1920

Asp Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Val Tyr Tyr Phe
1925 1930 1935

Gly Asp Asn Tyr Arg Ala Ala Ile Glu Trp Gln Thr Leu Asp Asp
1940 1945 1950

Glu Val Tyr Tyr Phe Ser Thr Asp Thr Gly Arg Ala Phe Lys Gly
1955 1960 1965

Leu Asn Gln Ile Gly Asp Asp Lys Phe Tyr Phe Asn Ser Asp Gly
1970 1975 1980

Ile Met Gln Lys Gly Phe Val Asn Ile Asn Asp Lys Thr Phe Tyr
1985 1990 1995

Phe Asp Asp Ser Gly Val Met Lys Ser Gly Tyr Thr Glu Ile Asp
2000 2005 2010

Gly Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly

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2015 2020 2025

Val Phe Asn Thr Ala Asp Gly Phe Lys Tyr Phe Ala His His Asp
2030 2035 2040

Glu Asp Leu Gly Asn Glu Glu Gly Glu Ala Leu Ser Tyr Ser Gly
2045 2050 2055

Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe
2060 2065 2070

Thr Ala Val Val Gly Trp Lys Asp Ser Glu Asp Gly Ser Lys Tyr
2075 2080 2085

Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Ile Ser Thr
2090 2095 2100

Ile Asn Asp Gly Lys Tyr Tyr Phe Asn Asp Ser Gly Ile Met Gln
2105 2110 2115

Ile Gly Phe Val Thr Ile Asn Asn Glu Val Phe Tyr Phe Ser Asp
2120 2125 2130

Ser Gly Ile Val Glu Ser Gly Met Gln Asn Ile Asp Asp Asn Tyr
2135 2140 2145

Phe Tyr Ile Asp Glu Asn Gly Leu Val Gln Ile Gly Val Phe Asp
2150 2155 2160

Thr Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn
2165 2170 2175

Asp Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg
2180 2185 2190

Val Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu
2195 2200 2205

Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr

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2210 2215 2220

Phe Asp Pro Glu Thr Lys Lys Ala Tyr Lys Gly Ile Asn Val Ile
2225 2230 2235

Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Asn Gly Ile Met Arg Thr
2240 2245 2250

Gly Leu Ile Thr Phe Glu Asp Asn His Tyr Tyr Phe Asn Glu Asp
2255 2260 2265

Gly Ile Met Gln Tyr Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe
2270 2275 2280

Tyr Phe Asn Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr
2285 2290 2295

Ala Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu
2300 2305 2310

Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu
2315 2320 2325

Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Ile
2330 2335 2340

Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp
2345 2350 2355

Thr Ala Glu Leu Val Ile Ser Glu
2360 2365

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<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 729

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Arg Val Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
            20                  25                  30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Thr Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Ile Leu Glu Leu Lys Asn Ser Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Ile Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Ile Glu Ser Ala Ser Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Glu Phe Asn His Thr Ala Phe Phe Arg Lys Arg Met Gln
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Gln Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Lys Glu Glu Asn Pro Asp Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205
```

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```
Leu Ser Asn Glu Tyr Ser Lys Asp Ile Asp Glu Leu Asn Ala Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Val Thr Glu Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Thr Gly Glu Val Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Gly Ala Ser Asp Ile Leu Arg
            260                 265                 270

Val Ala Ile Leu Lys Asn Ile Gly Gly Val Tyr Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile His Pro Asp Leu Phe Lys Asp Ile Asn Lys Pro Asp
    290                 295                 300

Ser Val Lys Thr Ala Val Asp Trp Glu Glu Met Gln Leu Glu Ala Ile
305                 310                 315                 320

Met Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Lys His Phe Asp
                325                 330                 335

Thr Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
            340                 345                 350

Lys Ser Asp Lys Ser Glu Ile Phe Leu Pro Leu Gly Asp Ile Glu Val
        355                 360                 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Ala Lys Gly Ser Ile Ile Asn
    370                 375                 380

Gln Ala Leu Ile Ser Ala Lys Asp Ser Tyr Cys Ser Asp Leu Leu Ile
385                 390                 395                 400

Lys Gln Ile Gln Asn Arg Tyr Lys Ile Leu Asn Asp Thr Leu Gly Pro
                405                 410                 415
```

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```
Ile Ile Ser Gln Gly Asn Asp Phe Asn Thr Thr Met Asn Asn Phe Gly
            420                 425                 430

Glu Ser Leu Gly Ala Ile Ala Asn Glu Glu Asn Ile Ser Phe Ile Ala
        435                 440                 445

Lys Ile Gly Ser Tyr Leu Arg Val Gly Phe Tyr Pro Glu Ala Asn Thr
    450                 455                 460

Thr Ile Thr Leu Ser Gly Pro Thr Ile Tyr Ala Gly Ala Tyr Lys Asp
465                 470                 475                 480

Leu Leu Thr Phe Lys Glu Met Ser Ile Asp Thr Ser Ile Leu Ser Ser
                485                 490                 495

Glu Leu Arg Asn Phe Glu Phe Pro Lys Val Asn Ile Ser Gln Ala Thr
            500                 505                 510

Glu Gln Glu Lys Asn Ser Leu Trp Gln Phe Asn Glu Glu Arg Ala Lys
        515                 520                 525

Ile Gln Phe Glu Glu Tyr Lys Lys Asn Tyr Phe Glu Gly Ala Leu Gly
    530                 535                 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Thr Val Ile Asp Lys Glu
545                 550                 555                 560

Tyr Leu Leu Glu Lys Ile Ser Ser Ser Thr Lys Ser Ser Glu Arg Gly
                565                 570                 575

Tyr Val His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
            580                 585                 590

Ala Ala Cys Asn Leu Phe Ala Lys Asn Pro Tyr Asp Ser Ile Leu Phe
        595                 600                 605

Gln Lys Asn Ile Glu Asp Ser Glu Val Ala Tyr Tyr Tyr Asn Pro Thr
    610                 615                 620
```

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```
Asp Ser Glu Ile Gln Glu Ile Asp Lys Tyr Arg Ile Pro Asp Arg Ile
625                 630                 635                 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Leu Ile Gly His Gly Lys Ala
                645                 650                 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser
            660                 665                 670

Ser Glu Ile Glu Thr Ile Ile Asp Leu Ala Lys Ala Asp Ile Ser Pro
        675                 680                 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser
    690                 695                 700

Val Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Arg Val Lys
705                 710                 715                 720

Asp Lys Val Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
                725                 730                 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg
            740                 745                 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
        755                 760                 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
    770                 775                 780

Asn Lys Ile Ile Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785                 790                 795                 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu
                805                 810                 815

Glu Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
            820                 825                 830
```

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```
Glu Thr Gln Val Val Glu Glu Arg Ile Glu Glu Ala Lys Ser Leu Thr
        835                 840                 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser
    850                 855                 860

Ile Ser Asp Ala Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Glu Glu
865                 870                 875                 880

Ser His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe
                885                 890                 895

Ser Ile Arg Phe Ile Asp Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
            900                 905                 910

Thr Glu Lys Ala Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu
        915                 920                 925

Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
    930                 935                 940

Val Lys Lys Val Asn Leu Asp Ala Thr His Glu Val Asn Thr Leu Asn
945                 950                 955                 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu
                965                 970                 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
            980                 985                 990

Leu Phe Ser Thr Gly Leu Asn Thr  Ile Thr Asp Ala Ala  Lys Val Val
        995                 1000                1005

Glu Leu  Val Ser Thr Ala Leu  Asp Glu Thr Ile Asp  Leu Leu Pro
    1010                1015                1020

Thr Leu  Ser Glu Gly Leu Pro  Val Ile Ala Thr Ile  Ile Asp Gly
    1025                1030                1035
```

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```
Val Ser  Leu Gly Ala Ala Ile  Lys Glu Leu Ser Glu  Thr Ser Asp
    1040                1045                1050

Pro Leu  Leu Arg Gln Glu Ile  Glu Ala Lys Ile Gly  Ile Met Ala
    1055                1060                1065

Val Asn  Leu Thr Ala Ala Thr  Thr Ala Ile Ile Thr  Ser Ser Leu
    1070                1075                1080

Gly Ile  Ala Ser Gly Phe Ser  Ile Leu Leu Val Pro  Leu Ala Gly
    1085                1090                1095

Ile Ser  Ala Gly Ile Pro Ser  Leu Val Asn Asn Glu  Leu Ile Leu
    1100                1105                1110

Arg Asp  Lys Ala Thr Lys Val  Val Asp Tyr Phe Ser  His Ile Ser
    1115                1120                1125

Leu Ala  Glu Ser Glu Gly Ala  Phe Thr Ser Leu Asp  Asp Lys Ile
    1130                1135                1140

Met Met  Pro Gln Asp Asp Leu  Val Ile Ser Glu Ile  Asp Phe Asn
    1145                1150                1155

Asn Asn  Ser Ile Thr Leu Gly  Lys Cys Glu Ile Trp  Arg Met Glu
    1160                1165                1170

Gly Gly  Ser Gly His Thr Val  Thr Asp Asp Ile Asp  His Phe Phe
    1175                1180                1185

Ser Ser  Pro Ser Ile Thr Tyr  Arg Glu Pro His Leu  Ser Ile Tyr
    1190                1195                1200

Asp Val  Leu Glu Val Lys Lys  Glu Glu Leu Asp Leu  Ser Lys Asp
    1205                1210                1215

Leu Met  Val Leu Pro Asn Ala  Pro Asn Arg Val Phe  Gly Trp Glu
    1220                1225                1230
```

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```
Thr Gly  Trp Thr Pro Gly Leu  Arg Gly Leu Glu Asn  Asp Gly Thr
    1235                1240                1245

Lys Leu  Leu Asp Arg Ile Arg  Asp Gln Tyr Glu Gly  Gln Phe Tyr
    1250                1255                1260

Trp Arg  Phe Phe Ala Phe Ile  Ala Asp Ala Leu Ile  Thr Thr Leu
    1265                1270                1275

Lys Pro  Arg Tyr Glu Asp Thr  Asn Val Arg Ile Ser  Leu Asp Ser
    1280                1285                1290

Asn Thr  Arg Ser Phe Ile Val  Pro Val Ile Thr Thr  Glu Tyr Ile
    1295                1300                1305

Arg Glu  Lys Leu Ser Tyr Ser  Phe Tyr Gly Ser Gly  Gly Thr Tyr
    1310                1315                1320

Ala Leu  Ser Leu Ser Gln Tyr  Asn Met Asn Ile Asn  Ile Glu Leu
    1325                1330                1335

Asn Glu  Asn Asp Thr Trp Val  Ile Asp Val Asp Asn  Val Val Arg
    1340                1345                1350

Ser Val  Thr Ile Glu Ser Asp  Lys Ile Lys Lys Gly  Asp Leu Ile
    1355                1360                1365

Glu Asn  Ile Leu Ser Lys Leu  Ser Ile Glu Asp Asn  Lys Ile Ile
    1370                1375                1380

Leu Asp  Asn His Glu Ile Asn  Phe Ser Gly Thr Leu  Asn Gly Gly
    1385                1390                1395

Asn Gly  Phe Val Ser Leu Thr  Phe Ser Ile Leu Glu  Gly Ile Asn
    1400                1405                1410

Ala Val  Ile Glu Val Asp Leu  Leu Ser Lys Ser Tyr  Lys Val Leu
    1415                1420                1425
```

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```
Ile Ser  Gly Glu Leu Lys Thr  Leu Met Ala Asn Ser  Asn Ser Val
    1430                1435                1440

Gln Gln  Lys Ile Asp Tyr Ile  Gly Leu Asn Ser Glu  Leu Gln Lys
    1445                1450                1455

Asn Ile  Pro Tyr Ser Phe Met  Asp Asp Lys Gly Lys  Glu Asn Gly
    1460                1465                1470

Phe Ile  Asn Cys Ser Thr Lys  Glu Gly Leu Phe Val  Ser Glu Leu
    1475                1480                1485

Ser Asp  Val Val Leu Ile Ile  Lys Val Tyr Met Asp  Asn Ser Lys
    1490                1495                1500

Pro Pro  Phe Gly Tyr Tyr Ser  Asn Asp Leu Lys Asp  Val Lys Ala
    1505                1510                1515

Ile Thr  Lys Asp Asp Val Ile  Ile Leu Thr Gly Tyr  Tyr Leu Lys
    1520                1525                1530

Asp Asp  Ile Lys Ile Ser Leu  Ser Phe Thr Ile Gln  Asp Lys Asn
    1535                1540                1545

Thr Ile  Lys Leu Asn Gly Val  Tyr Leu Asp Glu Asn  Gly Val Ala
    1550                1555                1560

Glu Ile  Leu Lys Phe Met Asn  Lys Lys Gly Ser Thr  Asn Thr Ser
    1565                1570                1575

Asp Ser  Leu Met Ser Phe Leu  Glu Ser Met Asn Ile  Lys Ser Ile
    1580                1585                1590

Phe Ile  Lys Ser Leu Lys Ser  Asn Ala Lys Leu Ile  Leu Asp Thr
    1595                1600                1605

Asn Phe  Ile Ile Ser Gly Thr  Thr Ser Ile Gly Gln  Phe Glu Phe
    1610                1615                1620
```

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```
Ile Cys  Asp Lys Asp Asn Asn  Ile Gln Pro Tyr Phe  Ile Lys Phe
    1625                1630                1635

Asn Thr  Leu Glu Thr Lys Tyr  Thr Leu Tyr Val Gly  Asn Arg Gln
    1640                1645                1650

Asn Met  Ile Val Glu Pro Asn  Tyr Asp Leu Asp Asp  Ser Gly Asp
    1655                1660                1665

Ile Ser  Ser Thr Val Ile Asn  Phe Ser Gln Lys Tyr  Leu Tyr Gly
    1670                1675                1680

Ile Asp  Ser Cys Val Asn Lys  Val Ile Ile Ser Pro  Asn Ile Tyr
    1685                1690                1695

Thr Asp  Glu Ile Asn Ile Thr  Pro Ile Tyr Glu Ala  Asn Asn Thr
    1700                1705                1710

Tyr Pro  Glu Val Ile Val Leu  Asp Thr Asn Tyr Ile  Ser Glu Lys
    1715                1720                1725

Ile Asn  Ile Asn Ile Asn Asp  Leu Ser Ile Arg Tyr  Val Trp Ser
    1730                1735                1740

Asn Asp  Gly Ser Asp Phe Ile  Leu Met Ser Thr Asp  Glu Glu Asn
    1745                1750                1755

Lys Val  Ser Gln Val Lys Ile  Arg Phe Thr Asn Val  Phe Lys Gly
    1760                1765                1770

Asn Thr  Ile Ser Asp Lys Ile  Ser Phe Asn Phe Ser  Asp Lys Gln
    1775                1780                1785

Asp Val  Ser Ile Asn Lys Ile  Ile Ser Thr Phe Thr  Pro Ser Tyr
    1790                1795                1800

Tyr Val  Glu Gly Leu Leu Asn  Tyr His Leu Gly Leu  Ile Ser Leu
    1805                1810                1815
```

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Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser
1820 1825 1830

Gly Leu Val Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro
1835 1840 1845

Ile Lys Asn Leu Ile Thr Gly Phe Thr Thr Ile Gly Asp Asp Lys
1850 1855 1860

Tyr Tyr Phe Asn Pro Asp Asn Gly Gly Ala Ala Ser Val Gly Glu
1865 1870 1875

Thr Ile Ile Asp Gly Lys Asn Tyr Tyr Phe Ser Pro Asn Gly Val
1880 1885 1890

Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
1895 1900 1905

Ala Pro Ala Asp Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile
1910 1915 1920

Asp Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Val Tyr Tyr Phe
1925 1930 1935

Gly Asp Asn Tyr Arg Ala Ala Ile Glu Trp Gln Thr Leu Asp Asp
1940 1945 1950

Glu Val Tyr Tyr Phe Ser Thr Asp Thr Gly Arg Ala Phe Lys Gly
1955 1960 1965

Leu Asn Gln Ile Gly Asp Asp Lys Phe Tyr Phe Asn Ser Asp Gly
1970 1975 1980

Ile Met Gln Lys Gly Phe Val Asn Ile Asn Asp Lys Thr Phe Tyr
1985 1990 1995

Phe Asp Asp Ser Gly Val Met Lys Ser Gly Tyr Thr Glu Ile Asp
2000 2005 2010

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Gly Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly
2015 2020 2025

Val Phe Asn Thr Ala Asp Gly Phe Lys Tyr Phe Ala His His Asp
2030 2035 2040

Glu Asp Leu Gly Asn Glu Glu Gly Glu Ala Leu Ser Tyr Ser Gly
2045 2050 2055

Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe
2060 2065 2070

Thr Ala Val Val Gly Trp Lys Asp Ser Glu Asp Gly Ser Lys Tyr
2075 2080 2085

Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Ile Ser Thr
2090 2095 2100

Ile Asn Asp Gly Lys Tyr Tyr Phe Asn Asp Ser Gly Ile Met Gln
2105 2110 2115

Ile Gly Phe Val Thr Ile Asn Asn Glu Val Phe Tyr Phe Ser Asp
2120 2125 2130

Ser Gly Ile Val Glu Ser Gly Met Gln Asn Ile Asp Asp Asn Tyr
2135 2140 2145

Phe Tyr Ile Asp Glu Asn Gly Leu Val Gln Ile Gly Val Phe Asp
2150 2155 2160

Thr Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn
2165 2170 2175

Asp Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg
2180 2185 2190

Val Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu
2195 2200 2205

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Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr
2210 2215 2220

Phe Asp Pro Glu Thr Lys Lys Ala Tyr Lys Gly Ile Asn Val Ile
2225 2230 2235

Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Asn Gly Ile Met Arg Thr
2240 2245 2250

Gly Leu Ile Thr Phe Glu Asp Asn His Tyr Tyr Phe Asn Glu Asp
2255 2260 2265

Gly Ile Met Gln Tyr Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe
2270 2275 2280

Tyr Phe Asn Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr
2285 2290 2295

Ala Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu
2300 2305 2310

Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu
2315 2320 2325

Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Ile
2330 2335 2340

Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp
2345 2350 2355

Thr Ala Glu Leu Val Ile Ser Glu
2360 2365

<210> 730
<211> 2366
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

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<400> 730

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Val Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Thr Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Ile Leu Glu Leu Lys Asn Ser Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Ile Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
130 135 140

Ile Glu Ser Ala Ser Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145 150 155 160

Asn Asp Pro Glu Phe Asn His Thr Ala Phe Phe Arg Lys Arg Met Gln
165 170 175

Ile Ile Tyr Asp Lys Gln Gln Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
180 185 190

Lys Glu Glu Asn Pro Asp Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr

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195 200 205

Leu Ser Asn Glu Tyr Ser Lys Asp Ile Asp Glu Leu Asn Ala Tyr Ile
210 215 220

Glu Glu Ser Leu Asn Lys Val Thr Glu Asn Ser Gly Asn Asp Val Arg
225 230 235 240

Asn Phe Glu Glu Phe Lys Thr Gly Glu Val Phe Asn Leu Tyr Glu Gln
245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Gly Ala Ser Asp Ile Leu Arg
260 265 270

Val Ala Ile Leu Lys Asn Ile Gly Gly Val Tyr Leu Ala Val Ala Met
275 280 285

Leu Pro Gly Ile His Pro Asp Leu Phe Lys Asp Ile Asn Lys Pro Asp
290 295 300

Ser Val Lys Thr Ala Val Asp Trp Glu Glu Met Gln Leu Glu Ala Ile
305 310 315 320

Met Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Lys His Phe Asp
325 330 335

Thr Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
340 345 350

Lys Ser Asp Lys Ser Glu Ile Phe Leu Pro Leu Gly Asp Ile Glu Val
355 360 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Ala Lys Gly Ser Ile Ile Asn
370 375 380

Gln Ala Leu Ile Ser Ala Lys Asp Ser Tyr Cys Ser Asp Leu Leu Ile
385 390 395 400

Lys Gln Ile Gln Asn Arg Tyr Lys Ile Leu Asn Asp Thr Leu Gly Pro

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405 410 415

Ile Ile Ser Gln Gly Asn Asp Phe Asn Thr Thr Met Asn Asn Phe Gly
420 425 430

Glu Ser Leu Gly Ala Ile Ala Asn Glu Glu Asn Ile Ser Phe Ile Ala
435 440 445

Lys Ile Gly Ser Tyr Leu Arg Val Gly Phe Tyr Pro Glu Ala Asn Thr
450 455 460

Thr Ile Thr Leu Ser Gly Pro Thr Ile Tyr Ala Gly Ala Tyr Lys Asp
465 470 475 480

Leu Leu Thr Phe Lys Glu Met Ser Ile Asp Thr Ser Ile Leu Ser Ser
485 490 495

Glu Leu Arg Asn Phe Glu Phe Pro Lys Val Asn Ile Ser Gln Ala Thr
500 505 510

Glu Gln Glu Lys Asn Ser Leu Trp Gln Phe Asn Glu Glu Arg Ala Lys
515 520 525

Ile Gln Phe Glu Glu Tyr Lys Lys Asn Tyr Phe Glu Gly Ala Leu Gly
530 535 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Thr Val Ile Asp Lys Glu
545 550 555 560

Tyr Leu Leu Glu Lys Ile Ser Ser Ser Thr Lys Ser Ser Glu Arg Gly
565 570 575

Tyr Val His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
580 585 590

Ala Ala Cys Asn Leu Phe Ala Lys Asn Pro Tyr Asp Ser Ile Leu Phe
595 600 605

Gln Lys Asn Ile Glu Asp Ser Glu Val Ala Tyr Tyr Tyr Asn Pro Thr

610 615 620

Asp Ser Glu Ile Gln Glu Ile Asp Lys Tyr Arg Ile Pro Asp Arg Ile
625 630 635 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Leu Ile Gly His Gly Lys Ala
645 650 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser
660 665 670

Ser Glu Ile Glu Thr Ile Ile Asp Leu Ala Lys Ala Asp Ile Ser Pro
675 680 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser
690 695 700

Val Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Arg Val Lys
705 710 715 720

Asp Lys Val Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
725 730 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg
740 745 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
755 760 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
770 775 780

Asn Lys Ile Ile Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785 790 795 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu
805 810 815

Glu Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile

820 825 830

Glu Thr Gln Val Val Glu Glu Arg Ile Glu Glu Ala Lys Ser Leu Thr
835 840 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser
850 855 860

Ile Ser Asp Ala Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Glu Glu
865 870 875 880

Ser His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe
885 890 895

Ser Ile Arg Phe Ile Asp Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
900 905 910

Thr Glu Lys Ala Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu
915 920 925

Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
930 935 940

Val Lys Lys Val Asn Leu Asp Ala Thr His Glu Val Asn Thr Leu Asn
945 950 955 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu
965 970 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
980 985 990

Leu Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp Ala Ala Lys Val Val
995 1000 1005

Glu Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu Pro
1010 1015 1020

Thr Leu Ser Glu Gly Leu Pro Val Ile Ala Thr Ile Ile Asp Gly

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1025 1030 1035

Val Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp
1040 1045 1050

Pro Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala
1055 1060 1065

Val Asn Leu Thr Ala Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu
1070 1075 1080

Gly Ile Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly
1085 1090 1095

Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile Leu
1100 1105 1110

Arg Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Ser His Ile Ser
1115 1120 1125

Leu Ala Glu Ser Glu Gly Ala Phe Thr Ser Leu Asp Asp Lys Ile
1130 1135 1140

Met Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn
1145 1150 1155

Asn Asn Ser Ile Thr Leu Gly Lys Cys Glu Ile Trp Arg Met Glu
1160 1165 1170

Gly Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe
1175 1180 1185

Ser Ser Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr
1190 1195 1200

Asp Val Leu Glu Val Lys Lys Glu Glu Leu Asp Leu Ser Lys Asp
1205 1210 1215

Leu Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Gly Trp Glu

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1220 1225 1230

Thr Gly Trp Thr Pro Gly Leu Arg Gly Leu Glu Asn Asp Gly Thr
1235 1240 1245

Lys Leu Leu Asp Arg Ile Arg Asp Gln Tyr Glu Gly Gln Phe Tyr
1250 1255 1260

Trp Arg Phe Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu
1265 1270 1275

Lys Pro Arg Tyr Glu Asp Thr Asn Val Arg Ile Ser Leu Asp Ser
1280 1285 1290

Asn Thr Arg Ser Phe Ile Val Pro Val Ile Thr Thr Glu Tyr Ile
1295 1300 1305

Arg Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr
1310 1315 1320

Ala Leu Ser Leu Ser Gln Tyr Asn Met Asn Ile Asn Ile Glu Leu
1325 1330 1335

Asn Glu Asn Asp Thr Trp Val Ile Asp Val Asp Asn Val Val Arg
1340 1345 1350

Ser Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile
1355 1360 1365

Glu Asn Ile Leu Ser Lys Leu Ser Ile Glu Asp Asn Lys Ile Ile
1370 1375 1380

Leu Asp Asn His Glu Ile Asn Phe Ser Gly Thr Leu Asn Gly Gly
1385 1390 1395

Asn Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn
1400 1405 1410

Ala Val Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Val Leu

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1415 1420 1425

Ile Ser Gly Glu Leu Lys Thr Leu Met Ala Asn Ser Asn Ser Val
1430 1435 1440

Gln Gln Lys Ile Asp Tyr Ile Gly Leu Asn Ser Glu Leu Gln Lys
1445 1450 1455

Asn Ile Pro Tyr Ser Phe Met Asp Asp Lys Gly Lys Glu Asn Gly
1460 1465 1470

Phe Ile Asn Cys Ser Thr Lys Asp Gly Leu Phe Val Ser Glu Leu
1475 1480 1485

Ser Asp Val Val Leu Ile Ile Lys Val Tyr Met Asp Asn Ser Lys
1490 1495 1500

Pro Pro Phe Gly Tyr Tyr Ser Asn Asp Leu Lys Asp Val Lys Ala
1505 1510 1515

Ile Thr Lys Asp Asp Val Ile Ile Leu Thr Gly Tyr Tyr Leu Lys
1520 1525 1530

Asp Asp Ile Lys Ile Ser Leu Ser Phe Thr Ile Gln Asp Lys Asn
1535 1540 1545

Thr Ile Lys Leu Asn Gly Val Tyr Leu Asp Glu Asn Gly Val Ala
1550 1555 1560

Glu Ile Leu Lys Phe Met Asn Lys Lys Gly Ser Thr Asn Thr Ser
1565 1570 1575

Asp Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile
1580 1585 1590

Phe Ile Lys Ser Leu Lys Ser Asn Ala Lys Leu Ile Leu Asp Thr
1595 1600 1605

Asn Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe

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1610 1615 1620

Ile Cys Asp Lys Asp Asn Asn Ile Gln Pro Tyr Phe Ile Lys Phe
1625 1630 1635

Asn Thr Leu Glu Thr Lys Tyr Thr Leu Tyr Val Gly Asn Arg Gln
1640 1645 1650

Asn Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp
1655 1660 1665

Ile Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly
1670 1675 1680

Ile Asp Ser Cys Val Asn Lys Val Ile Ile Ser Pro Asn Ile Tyr
1685 1690 1695

Thr Asp Glu Ile Asn Ile Thr Pro Ile Tyr Glu Ala Asn Asn Thr
1700 1705 1710

Tyr Pro Glu Val Ile Val Leu Asp Thr Asn Tyr Ile Ser Glu Lys
1715 1720 1725

Ile Asn Ile Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser
1730 1735 1740

Asn Asp Gly Ser Asp Phe Ile Leu Met Ser Thr Asp Glu Glu Asn
1745 1750 1755

Lys Val Ser Gln Val Lys Ile Arg Phe Thr Asn Val Phe Lys Gly
1760 1765 1770

Asn Thr Ile Ser Asp Lys Ile Ser Phe Asn Phe Ser Asp Lys Gln
1775 1780 1785

Asp Val Ser Ile Asn Lys Ile Ile Ser Thr Phe Thr Pro Ser Tyr
1790 1795 1800

Tyr Val Glu Gly Leu Leu Asn Tyr His Leu Gly Leu Ile Ser Leu

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1805 1810 1815

Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser
1820 1825 1830

Gly Leu Val Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro
1835 1840 1845

Ile Lys Asn Leu Ile Thr Gly Phe Thr Thr Ile Gly Asp Asp Lys
1850 1855 1860

Tyr Tyr Phe Asn Pro Asp Asn Gly Gly Ala Ala Ser Val Gly Glu
1865 1870 1875

Thr Ile Ile Asp Gly Lys Asn Tyr Tyr Phe Ser Pro Asn Gly Val
1880 1885 1890

Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
1895 1900 1905

Ala Pro Ala Asp Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile
1910 1915 1920

Asp Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Val Tyr Tyr Phe
1925 1930 1935

Gly Asp Asn Tyr Arg Ala Ala Ile Glu Trp Gln Thr Leu Asp Asp
1940 1945 1950

Glu Val Tyr Tyr Phe Ser Thr Asp Thr Gly Arg Ala Phe Lys Gly
1955 1960 1965

Leu Asn Gln Ile Gly Asp Asp Lys Phe Tyr Phe Asn Ser Asp Gly
1970 1975 1980

Ile Met Gln Lys Gly Phe Val Asn Ile Asn Asp Lys Thr Phe Tyr
1985 1990 1995

Phe Asp Asp Ser Gly Val Met Lys Ser Gly Tyr Thr Glu Ile Asp

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2000 2005 2010

Gly Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly
2015 2020 2025

Val Phe Asn Thr Ala Asp Gly Phe Lys Tyr Phe Ala His His Asp
2030 2035 2040

Glu Asp Leu Gly Asn Glu Glu Gly Glu Ala Leu Ser Tyr Ser Gly
2045 2050 2055

Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe
2060 2065 2070

Thr Ala Val Val Gly Trp Lys Asp Ser Glu Asp Gly Ser Lys Tyr
2075 2080 2085

Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Ile Ser Thr
2090 2095 2100

Ile Asn Asp Gly Lys Tyr Tyr Phe Asn Asp Ser Gly Ile Met Gln
2105 2110 2115

Ile Gly Phe Val Thr Ile Asn Asn Glu Val Phe Tyr Phe Ser Asp
2120 2125 2130

Ser Gly Ile Val Glu Ser Gly Met Gln Asn Ile Asp Asp Asn Tyr
2135 2140 2145

Phe Tyr Ile Asp Glu Asn Gly Leu Val Gln Ile Gly Val Phe Asp
2150 2155 2160

Thr Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn
2165 2170 2175

Asp Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg
2180 2185 2190

Val Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu

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2195 2200 2205

Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr
2210 2215 2220

Phe Asp Pro Glu Thr Lys Lys Ala Tyr Lys Gly Ile Asn Val Ile
2225 2230 2235

Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Asn Gly Ile Met Arg Thr
2240 2245 2250

Gly Leu Ile Thr Phe Glu Asp Asn His Tyr Tyr Phe Asn Glu Asp
2255 2260 2265

Gly Ile Met Gln Tyr Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe
2270 2275 2280

Tyr Phe Asn Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr
2285 2290 2295

Ala Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu
2300 2305 2310

Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu
2315 2320 2325

Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Ile
2330 2335 2340

Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp
2345 2350 2355

Thr Ala Glu Leu Val Ile Ser Glu
2360 2365

<210> 731
<211> 2365
<212> PRT
<213> Artificial Sequence

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<220>
<223> Synthetic amino acid sequence

<400> 731

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Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1               5                  10                  15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
            20                  25                  30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190
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```
Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400
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```
Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545                 550                 555                 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
            580                 585                 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
        595                 600                 605
```

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```
Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
    610                 615                 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625                 630                 635                 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
                645                 650                 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
            660                 665                 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
        675                 680                 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
    690                 695                 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705                 710                 715                 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
                725                 730                 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
            740                 745                 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
        755                 760                 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
    770                 775                 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785                 790                 795                 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
                805                 810                 815
```

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```
Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
            820                 825                 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
        835                 840                 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
    850                 855                 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865                 870                 875                 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
                885                 890                 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
        915                 920                 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020
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Leu Ser Glu Gly Leu Pro Ile Ile Ala Thr Ile Ile Asp Gly Val
1025 1030 1035

Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp Pro
1040 1045 1050

Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala Val
1055 1060 1065

Asn Leu Thr Thr Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu Gly
1070 1075 1080

Val Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile
1085 1090 1095

Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg
1100 1105 1110

Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Val Ser Leu
1115 1120 1125

Val Glu Thr Glu Gly Val Phe Thr Leu Leu Asp Asp Lys Ile Met
1130 1135 1140

Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

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```
Met Val  Leu Pro Asn Ala Pro  Asn Arg Val Phe Ala  Trp Glu Thr
    1220                1225                1230

Gly Trp  Thr Pro Gly Leu Arg  Ser Leu Glu Asn Asp  Gly Thr Lys
    1235                1240                1245

Leu Leu  Asp Arg Ile Arg Asp  Asn Tyr Glu Gly Glu  Phe Tyr Trp
    1250                1255                1260

Arg Tyr  Phe Ala Phe Ile Ala  Asp Ala Leu Ile Thr  Thr Leu Lys
    1265                1270                1275

Pro Arg  Tyr Glu Asp Thr Asn  Ile Arg Ile Asn Leu  Asp Ser Asn
    1280                1285                1290

Thr Arg  Ser Phe Ile Val Pro  Ile Ile Thr Thr Glu  Tyr Ile Arg
    1295                1300                1305

Glu Lys  Leu Ser Tyr Ser Phe  Tyr Gly Ser Gly Gly  Thr Tyr Ala
    1310                1315                1320

Leu Ser  Leu Ser Gln Tyr Asn  Met Gly Ile Asn Ile  Glu Leu Ser
    1325                1330                1335

Glu Ser  Asp Val Trp Ile Ile  Asp Val Asp Asn Val  Val Arg Asp
    1340                1345                1350

Val Thr  Ile Glu Ser Asp Lys  Ile Lys Lys Gly Asp  Leu Ile Glu
    1355                1360                1365

Gly Ile  Leu Ser Thr Leu Ser  Ile Glu Glu Asn Lys  Ile Ile Leu
    1370                1375                1380

Asn Ser  His Glu Ile Asn Phe  Ser Gly Glu Val Asn  Gly Ser Asn
    1385                1390                1395

Gly Phe  Val Ser Leu Thr Phe  Ser Ile Leu Glu Gly  Ile Asn Ala
    1400                1405                1410
```

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Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys Thr
1535 1540 1545

Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Arg Lys Gly Asn Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe
1580 1585 1590

Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala Asn
1595 1600 1605

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Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

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Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Tyr Lys Tyr Tyr Phe Asn Ser Asp Gly Val
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe
1985 1990 1995

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Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

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Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 732
<211> 2365
<212> PRT

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<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 732

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Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1               5                  10                  15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
            20                  25                  30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
```

```
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
```

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385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
530 535 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545 550 555 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
565 570 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
580 585 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln

595 600 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
610 615 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625 630 635 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
645 650 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
660 665 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
675 680 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
690 695 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705 710 715 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
725 730 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
740 745 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
755 760 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
770 775 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785 790 795 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu

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805 810 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
820 825 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
835 840 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
850 855 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865 870 875 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
885 890 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
900 905 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
915 920 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
930 935 940

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945 950 955 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
965 970 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
980 985 990

Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp Ala Ala Lys Val Val Glu
995 1000 1005

Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu Pro Thr

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1010 1015 1020

Leu Ser Glu Gly Leu Pro Ile Ile Ala Thr Ile Ile Asp Gly Val
1025 1030 1035

Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp Pro
1040 1045 1050

Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala Val
1055 1060 1065

Asn Leu Thr Thr Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu Gly
1070 1075 1080

Ile Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile
1085 1090 1095

Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg
1100 1105 1110

Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Val Ser Leu
1115 1120 1125

Val Glu Thr Glu Gly Val Phe Thr Leu Leu Asp Asp Lys Ile Met
1130 1135 1140

Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu

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```
    1205                1210                1215

Met Val  Leu Pro Asn Ala Pro  Asn Arg Val Phe Ala  Trp Glu Thr
    1220                1225                1230

Gly Trp  Thr Pro Gly Leu Arg  Ser Leu Glu Asn Asp  Gly Thr Lys
    1235                1240                1245

Leu Leu  Asp Arg Ile Arg Asp  Asn Tyr Glu Gly Glu  Phe Tyr Trp
    1250                1255                1260

Arg Tyr  Phe Ala Phe Ile Ala  Asp Ala Leu Ile Thr  Thr Leu Lys
    1265                1270                1275

Pro Arg  Tyr Glu Asp Thr Asn  Ile Arg Ile Asn Leu  Asp Ser Asn
    1280                1285                1290

Thr Arg  Ser Phe Ile Val Pro  Ile Ile Thr Thr Glu  Tyr Ile Arg
    1295                1300                1305

Glu Lys  Leu Ser Tyr Ser Phe  Tyr Gly Ser Gly Gly  Thr Tyr Ala
    1310                1315                1320

Leu Ser  Leu Ser Gln Tyr Asn  Met Gly Ile Asn Ile  Glu Leu Ser
    1325                1330                1335

Glu Ser  Asp Val Trp Ile Ile  Asp Val Asp Asn Val  Val Arg Asp
    1340                1345                1350

Val Thr  Ile Glu Ser Asp Lys  Ile Lys Lys Gly Asp  Leu Ile Glu
    1355                1360                1365

Gly Ile  Leu Ser Thr Leu Ser  Ile Glu Glu Asn Lys  Ile Ile Leu
    1370                1375                1380

Asn Ser  His Glu Ile Asn Phe  Ser Gly Glu Val Asn  Gly Ser Asn
    1385                1390                1395

Gly Phe  Val Ser Leu Thr Phe  Ser Ile Leu Glu Gly  Ile Asn Ala
```

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1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys Thr
1535 1540 1545

Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Arg Lys Gly Asn Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe
1580 1585 1590

Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala Asn

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1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr Tyr

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1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Val
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe

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1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val

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2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 733

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<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 733

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Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1               5                  10                  15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
            20                  25                  30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175
```

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```
Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380
```

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```
Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545                 550                 555                 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
            580                 585                 590
```

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```
Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
        595                 600                 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
    610                 615                 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625                 630                 635                 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
                645                 650                 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
            660                 665                 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
        675                 680                 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
    690                 695                 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705                 710                 715                 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
                725                 730                 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
            740                 745                 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
        755                 760                 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
    770                 775                 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785                 790                 795                 800
```

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```
Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
                805                 810                 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
            820                 825                 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
        835                 840                 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
    850                 855                 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865                 870                 875                 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
                885                 890                 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
        915                 920                 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005
```

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```
Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Ile  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050

Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
    1055                1060                1065

Asn Leu  Thr Thr Ala Thr Thr  Ala Ile Ile Thr Ser  Ser Leu Gly
    1070                1075                1080

Ile Ala  Ser Gly Phe Ser Ile  Leu Leu Val Pro Leu  Ala Gly Ile
    1085                1090                1095

Ser Ala  Gly Ile Pro Ser Leu  Val Asn Asn Glu Leu  Val Leu Arg
    1100                1105                1110

Asp Lys  Ala Thr Lys Val Val  Asp Tyr Phe Lys His  Val Ser Leu
    1115                1120                1125

Val Glu  Thr Glu Gly Val Phe  Thr Leu Leu Asp Asp  Lys Ile Met
    1130                1135                1140

Met Pro  Gln Asp Asp Leu Val  Ile Ser Glu Ile Asp  Phe Asn Asn
    1145                1150                1155

Asn Ser  Ile Val Leu Gly Lys  Cys Glu Ile Trp Arg  Met Glu Gly
    1160                1165                1170

Gly Ser  Gly His Thr Val Thr  Asp Asp Ile Asp His  Phe Phe Ser
    1175                1180                1185

Ala Pro  Ser Ile Thr Tyr Arg  Glu Pro His Leu Ser  Ile Tyr Asp
    1190                1195                1200
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Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile Leu
1370 1375 1380

Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser Asn
1385 1390 1395

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```
Gly Phe  Val Ser Leu Thr Phe  Ser Ile Leu Glu Gly  Ile Asn Ala
    1400                1405                1410

Ile Ile  Glu Val Asp Leu Leu  Ser Lys Ser Tyr Lys  Leu Leu Ile
    1415                1420                1425

Ser Gly  Glu Leu Lys Ile Leu  Met Leu Asn Ser Asn  His Ile Gln
    1430                1435                1440

Gln Lys  Ile Asp Tyr Ile Gly  Phe Asn Ser Glu Leu  Gln Lys Asn
    1445                1450                1455

Ile Pro  Tyr Ser Phe Val Asp  Ser Glu Gly Lys Glu  Asn Gly Phe
    1460                1465                1470

Ile Asn  Gly Ser Thr Lys Glu  Gly Leu Phe Val Ser  Glu Leu Pro
    1475                1480                1485

Asp Val  Val Leu Ile Ser Lys  Val Tyr Met Asp Asp  Ser Lys Pro
    1490                1495                1500

Ser Phe  Gly Tyr Tyr Ser Asn  Asn Leu Lys Asp Val  Lys Val Ile
    1505                1510                1515

Thr Lys  Asp Asn Val Asn Ile  Leu Thr Gly Tyr Tyr  Leu Lys Asp
    1520                1525                1530

Asp Ile  Lys Ile Ser Leu Ser  Leu Thr Leu Gln Asp  Glu Lys Thr
    1535                1540                1545

Ile Lys  Leu Asn Ser Val His  Leu Asp Glu Ser Gly  Val Ala Glu
    1550                1555                1560

Ile Leu  Lys Phe Met Asn Arg  Lys Gly Asn Thr Asn  Thr Ser Asp
    1565                1570                1575

Ser Leu  Met Ser Phe Leu Glu  Ser Met Asn Ile Lys  Ser Ile Phe
    1580                1585                1590
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```
Val Asn  Phe Leu Gln Ser Asn  Ile Lys Phe Ile Leu  Asp Ala Asn
    1595                1600                1605

Phe Ile  Ile Ser Gly Thr Thr  Ser Ile Gly Gln Phe  Glu Phe Ile
    1610                1615                1620

Cys Asp  Glu Asn Asp Asn Ile  Gln Pro Tyr Phe Ile  Lys Phe Asn
    1625                1630                1635

Thr Leu  Glu Thr Asn Tyr Thr  Leu Tyr Val Gly Asn  Arg Gln Asn
    1640                1645                1650

Met Ile  Val Glu Pro Asn Tyr  Asp Leu Asp Asp Ser  Gly Asp Ile
    1655                1660                1665

Ser Ser  Thr Val Ile Asn Phe  Ser Gln Lys Tyr Leu  Tyr Gly Ile
    1670                1675                1680

Asp Ser  Cys Val Asn Lys Val  Val Ile Ser Pro Asn  Ile Tyr Thr
    1685                1690                1695

Asp Glu  Ile Asn Ile Thr Pro  Val Tyr Glu Thr Asn  Asn Thr Tyr
    1700                1705                1710

Pro Glu  Val Ile Val Leu Asp  Ala Asn Tyr Ile Asn  Glu Lys Ile
    1715                1720                1725

Asn Val  Asn Ile Asn Asp Leu  Ser Ile Arg Tyr Val  Trp Ser Asn
    1730                1735                1740

Asp Gly  Asn Asp Phe Ile Leu  Met Ser Thr Ser Glu  Glu Asn Lys
    1745                1750                1755

Val Ser  Gln Val Lys Ile Arg  Phe Val Asn Val Phe  Lys Asp Lys
    1760                1765                1770

Thr Leu  Ala Asn Lys Leu Ser  Phe Asn Phe Ser Asp  Lys Gln Asp
    1775                1780                1785
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Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Leu Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Val
1970 1975 1980

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Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

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```
Asn Ile  Tyr Gly Gln Ala Val  Glu Tyr Ser Gly Leu  Val Arg Val
    2180                2185                2190

Gly Glu  Asp Val Tyr Tyr Phe  Gly Glu Thr Tyr Thr  Ile Glu Thr
    2195                2200                2205

Gly Trp  Ile Tyr Asp Met Glu  Asn Glu Ser Asp Lys  Tyr Tyr Phe
    2210                2215                2220

Asn Pro  Glu Thr Lys Lys Ala  Cys Lys Gly Ile Asn  Leu Ile Asp
    2225                2230                2235

Asp Ile  Lys Tyr Tyr Phe Asp  Glu Lys Gly Ile Met  Arg Thr Gly
    2240                2245                2250

Leu Ile  Ser Phe Glu Asn Asn  Asn Tyr Tyr Phe Asn  Glu Asn Gly
    2255                2260                2265

Glu Met  Gln Phe Gly Tyr Ile  Asn Ile Glu Asp Lys  Met Phe Tyr
    2270                2275                2280

Phe Gly  Glu Asp Gly Val Met  Gln Ile Gly Val Phe  Asn Thr Pro
    2285                2290                2295

Asp Gly  Phe Lys Tyr Phe Ala  His Gln Asn Thr Leu  Asp Glu Asn
    2300                2305                2310

Phe Glu  Gly Glu Ser Ile Asn  Tyr Thr Gly Trp Leu  Asp Leu Asp
    2315                2320                2325

Glu Lys  Arg Tyr Tyr Phe Thr  Asp Glu Tyr Ile Ala  Ala Thr Gly
    2330                2335                2340

Ser Val  Ile Ile Asp Gly Glu  Glu Tyr Tyr Phe Asp  Pro Asp Thr
    2345                2350                2355

Ala Gln  Leu Val Ile Ser Glu
    2360                2365
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<210> 734
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 734

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Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
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Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
            20                  25                  30


Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45


Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60


Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80


Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95


Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110


Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125


Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140


Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160


Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
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                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
```

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370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
530 535 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545 550 555 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
565 570 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala

580 585 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
595 600 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
610 615 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625 630 635 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
645 650 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
660 665 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
675 680 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
690 695 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705 710 715 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
725 730 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
740 745 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
755 760 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
770 775 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu

785 790 795 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
805 810 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
820 825 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
835 840 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
850 855 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865 870 875 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
885 890 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
900 905 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
915 920 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
930 935 940

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945 950 955 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
965 970 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
980 985 990

Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp Ala Ala Lys Val Val Glu

995 1000 1005

Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu Pro Thr
1010 1015 1020

Leu Ser Glu Gly Leu Pro Ile Ile Ala Thr Ile Ile Asp Gly Val
1025 1030 1035

Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp Pro
1040 1045 1050

Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala Val
1055 1060 1065

Asn Leu Thr Thr Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu Gly
1070 1075 1080

Val Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile
1085 1090 1095

Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg
1100 1105 1110

Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Val Ser Leu
1115 1120 1125

Val Glu Thr Glu Gly Val Phe Thr Leu Leu Asp Asp Lys Ile Met
1130 1135 1140

Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr Asp

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1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile Leu
1370 1375 1380

Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser Asn

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1385 1390 1395

Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys Thr
1535 1540 1545

Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Arg Lys Gly Asn Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe

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1580 1585 1590

Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp

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1775 1780 1785

Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Tyr Lys Tyr Tyr Phe Asn Ser Asp Gly Val

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1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp

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2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu

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2360 2365

<210> 735
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 735

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
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Arg Val Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
130 135 140

Val Glu Ser Ala Thr Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145 150 155 160

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Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Tyr Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Thr Gln
            180                 185                 190

Arg Glu Glu Asn Pro Asp Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Asp Ile Asp Glu Leu Asn Ser Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Val Thr Glu Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Gly Gly Glu Ser Phe Lys Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Val Gly Gly Val Tyr Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Val Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365
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Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Ala Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Lys Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Thr Val Val Asp Lys Glu Tyr
545                 550                 555                 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575
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Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
            580                 585                 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
        595                 600                 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
    610                 615                 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625                 630                 635                 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
                645                 650                 655

Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser Thr
            660                 665                 670

Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
        675                 680                 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Val
    690                 695                 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Arg Val Lys Asp
705                 710                 715                 720

Lys Val Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
                725                 730                 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
            740                 745                 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
        755                 760                 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
    770                 775                 780
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Lys Ile Ile Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785                 790                 795                 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
                805                 810                 815

Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
            820                 825                 830

Thr Gln Val Val Glu Gly Arg Ile Glu Glu Ala Lys Ser Leu Thr Ser
        835                 840                 845

Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser Ile
    850                 855                 860

Ser Asp Ala Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Glu Glu Ser
865                 870                 875                 880

His Phe Ile Ser Phe Glu Asp Ile Leu Glu Thr Asp Glu Gly Phe Ser
                885                 890                 895

Ile Arg Phe Ile Asp Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Ala Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
        915                 920                 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Ala Thr His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990
```

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```
Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005


Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020


Leu Ser  Glu Gly Leu Pro Val  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035


Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050


Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
    1055                1060                1065


Asn Leu  Thr Ala Ala Thr Thr  Ala Ile Ile Thr Ser  Ser Leu Gly
    1070                1075                1080


Ile Ala  Ser Gly Phe Ser Ile  Leu Leu Val Pro Leu  Ala Gly Ile
    1085                1090                1095


Ser Ala  Gly Ile Pro Ser Leu  Val Asn Asn Glu Leu  Ile Leu Arg
    1100                1105                1110


Asp Lys  Ala Thr Lys Val Val  Asp Tyr Phe Ser His  Ile Ser Leu
    1115                1120                1125


Ala Glu  Ser Glu Gly Ala Phe  Thr Ser Leu Asp Asp  Lys Ile Met
    1130                1135                1140


Met Pro  Gln Asp Asp Leu Val  Ile Ser Glu Ile Asp  Phe Asn Asn
    1145                1150                1155


Asn Ser  Ile Thr Leu Gly Lys  Cys Glu Ile Trp Arg  Met Glu Gly
    1160                1165                1170


Gly Ser  Gly His Thr Val Thr  Asp Asp Ile Asp His  Phe Phe Ser
    1175                1180                1185
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```
Ala Pro  Ser Ile Thr Tyr Arg  Glu Pro His Leu Ser  Ile Tyr Asp
    1190                 1195                 1200

Val Leu  Glu Val Gln Lys Glu  Glu Leu Asp Leu Ser  Lys Asp Leu
    1205                 1210                 1215

Met Val  Leu Pro Asn Ala Pro  Asn Arg Val Phe Ala  Trp Glu Thr
    1220                 1225                 1230

Gly Trp  Thr Pro Gly Leu Arg  Ser Leu Glu Asn Asp  Gly Thr Lys
    1235                 1240                 1245

Leu Leu  Asp Arg Ile Arg Asp  Asn Tyr Glu Gly Glu  Phe Tyr Trp
    1250                 1255                 1260

Arg Tyr  Phe Ala Phe Ile Ala  Asp Ala Leu Ile Thr  Thr Leu Lys
    1265                 1270                 1275

Pro Arg  Tyr Glu Asp Thr Asn  Ile Arg Ile Asn Leu  Asp Ser Asn
    1280                 1285                 1290

Thr Arg  Ser Phe Ile Val Pro  Val Ile Thr Thr Glu  Tyr Ile Arg
    1295                 1300                 1305

Glu Lys  Leu Ser Tyr Ser Phe  Tyr Gly Ser Gly Gly  Thr Tyr Ala
    1310                 1315                 1320

Leu Ser  Leu Ser Gln Tyr Asn  Met Asn Ile Asn Ile  Glu Leu Asn
    1325                 1330                 1335

Glu Asn  Asp Thr Trp Val Ile  Asp Val Asp Asn Val  Val Arg Asp
    1340                 1345                 1350

Val Thr  Ile Glu Ser Asp Lys  Ile Lys Lys Gly Asp  Leu Ile Glu
    1355                 1360                 1365

Asn Ile  Leu Ser Lys Leu Ser  Ile Glu Asp Asn Lys  Ile Ile Leu
    1370                 1375                 1380
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Asp Asn  His Glu Ile Asn Phe  Ser Gly Thr Leu Asn  Gly Gly Asn
    1385                1390                1395

Gly Phe  Val Ser Leu Thr Phe  Ser Ile Leu Glu Gly  Ile Asn Ala
    1400                1405                1410

Val Ile  Glu Val Asp Leu Leu  Ser Lys Ser Tyr Lys  Val Leu Ile
    1415                1420                1425

Ser Gly  Glu Leu Lys Thr Leu  Met Ala Asn Ser Asn  Ser Val Gln
    1430                1435                1440

Gln Lys  Ile Asp Tyr Ile Gly  Leu Asn Ser Glu Leu  Gln Lys Asn
    1445                1450                1455

Ile Pro  Tyr Ser Phe Met Asp  Asp Lys Gly Lys Glu  Asn Gly Phe
    1460                1465                1470

Ile Asn  Cys Ser Thr Lys Glu  Gly Leu Phe Val Ser  Glu Leu Ser
    1475                1480                1485

Asp Val  Val Leu Ile Ser Lys  Val Tyr Met Asp Asn  Ser Lys Pro
    1490                1495                1500

Leu Phe  Gly Tyr Cys Ser Asn  Asp Leu Lys Asp Val  Lys Val Ile
    1505                1510                1515

Thr Lys  Asp Asp Val Ile Ile  Leu Thr Gly Tyr Tyr  Leu Lys Asp
    1520                1525                1530

Asp Ile  Lys Ile Ser Leu Ser  Phe Thr Ile Gln Asp  Glu Asn Thr
    1535                1540                1545

Ile Lys  Leu Asn Gly Val Tyr  Leu Asp Glu Asn Gly  Val Ala Glu
    1550                1555                1560

Ile Leu  Lys Phe Met Asn Lys  Lys Gly Ser Thr Asn  Thr Ser Asp
    1565                1570                1575
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Ser Leu  Met Ser Phe Leu Glu  Ser Met Asn Ile Lys  Ser Ile Phe
    1580                1585                1590

Ile Asn  Ser Leu Gln Ser Asn  Thr Lys Leu Ile Leu  Asp Thr Asn
    1595                1600                1605

Phe Ile  Ile Ser Gly Thr Thr  Ser Ile Gly Gln Phe  Glu Phe Ile
    1610                1615                1620

Cys Asp  Lys Asp Asn Asn Ile  Gln Pro Tyr Phe Ile  Lys Phe Asn
    1625                1630                1635

Thr Leu  Glu Thr Lys Tyr Thr  Leu Tyr Val Gly Asn  Arg Gln Asn
    1640                1645                1650

Met Ile  Val Glu Pro Asn Tyr  Asp Leu Asp Asp Ser  Gly Asp Ile
    1655                1660                1665

Ser Ser  Thr Val Ile Asn Phe  Ser Gln Lys Tyr Leu  Tyr Gly Ile
    1670                1675                1680

Asp Ser  Cys Val Asn Lys Val  Ile Ile Ser Pro Asn  Ile Tyr Thr
    1685                1690                1695

Asp Glu  Ile Asn Ile Thr Pro  Ile Tyr Glu Ala Asn  Asn Thr Tyr
    1700                1705                1710

Pro Glu  Val Ile Val Leu Asp  Thr Asn Tyr Ile Ser  Glu Lys Ile
    1715                1720                1725

Asn Ile  Asn Ile Asn Asp Leu  Ser Ile Arg Tyr Val  Trp Ser Asn
    1730                1735                1740

Asp Gly  Ser Asp Phe Ile Leu  Met Ser Thr Asp Glu  Glu Asn Lys
    1745                1750                1755

Val Ser  Gln Val Lys Ile Arg  Phe Thr Asn Val Phe  Lys Gly Asn
    1760                1765                1770
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Thr Ile Ser Asp Lys Ile Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Ser Ile Asn Lys Val Ile Ser Thr Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Val Glu Gly Leu Leu Asn Tyr Asp Leu Gly Leu Ile Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Val Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Ile
1835 1840 1845

Lys Asn Leu Ile Thr Gly Phe Thr Thr Ile Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Asp Asn Gly Gly Ala Ala Ser Val Gly Glu Thr
1865 1870 1875

Ile Ile Asp Gly Lys Asn Tyr Tyr Phe Ser Gln Asn Gly Val Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asp Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Thr Ile Asp Glu Asn Val Tyr Tyr Phe Gly
1925 1930 1935

Asp Asn Tyr Arg Ala Ala Ile Glu Trp Gln Thr Leu Asp Asp Glu
1940 1945 1950

Val Tyr Tyr Phe Ser Thr Asp Thr Gly Arg Ala Phe Lys Gly Leu
1955 1960 1965

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Asn Gln Ile Gly Asp Asp Lys Phe Tyr Phe Asn Ser Asp Gly Ile
1970 1975 1980

Met Gln Lys Gly Phe Val Asn Ile Asn Asp Lys Thr Phe Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Ser Gly Tyr Thr Glu Ile Asp Gly
2000 2005 2010

Lys Tyr Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Ala Asp Gly Phe Lys Tyr Phe Ala His His Asp Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Ala Leu Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Ile Ser Ile Ile
2090 2095 2100

Asn Asp Gly Lys Tyr Tyr Phe Asn Asp Ser Gly Ile Met Gln Ile
2105 2110 2115

Gly Phe Val Thr Ile Asn Asn Glu Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Val Glu Ser Gly Met Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Glu Asn Gly Leu Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

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Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asp Pro Glu Thr Lys Lys Ala Tyr Lys Gly Ile Asn Val Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Asn Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Thr Phe Glu Asp Asn His Tyr Tyr Phe Asn Glu Asp Gly
2255 2260 2265

Ile Met Gln Tyr Gly Tyr Leu Asn Ile Glu Asp Lys Thr Phe Tyr
2270 2275 2280

Phe Ser Glu Asp Gly Ile Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

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Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 736
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 736

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
130 135 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu

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145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
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355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
530 535 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545 550 555 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr

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565 570 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
580 585 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
595 600 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
610 615 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625 630 635 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
645 650 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
660 665 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
675 680 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
690 695 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705 710 715 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
725 730 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
740 745 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
755 760 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn

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770 775 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785 790 795 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
805 810 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
820 825 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
835 840 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
850 855 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865 870 875 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
885 890 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
900 905 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
915 920 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
930 935 940

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945 950 955 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
965 970 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu

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980 985 990

Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp Ala Ala Lys Val Val Glu
995 1000 1005

Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu Pro Thr
1010 1015 1020

Leu Ser Glu Gly Leu Pro Ile Ile Ala Thr Ile Ile Asp Gly Val
1025 1030 1035

Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp Pro
1040 1045 1050

Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala Val
1055 1060 1065

Asn Leu Thr Thr Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu Gly
1070 1075 1080

Val Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile
1085 1090 1095

Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg
1100 1105 1110

Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Val Ser Leu
1115 1120 1125

Val Glu Thr Glu Gly Val Phe Thr Leu Leu Asp Asp Lys Ile Met
1130 1135 1140

Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe Ser

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1175 1180 1185

Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile Leu

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1370 1375 1380

Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys Thr
1535 1540 1545

Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Arg Lys Gly Asn Thr Asn Thr Ser Asp

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1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe
1580 1585 1590

Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys

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1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu

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1955 1960 1965

Asn Gln Ile Gly Asp Tyr Lys Tyr Tyr Phe Asn Ser Asp Gly Val
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr

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2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr

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2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 737
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 737

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
130 135 140

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```
Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350
```

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Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545                 550                 555                 560
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```
Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
            580                 585                 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
        595                 600                 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
    610                 615                 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625                 630                 635                 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
                645                 650                 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
            660                 665                 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
        675                 680                 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
    690                 695                 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705                 710                 715                 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
                725                 730                 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
            740                 745                 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
        755                 760                 765
```

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```
Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
    770                 775                 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785                 790                 795                 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
                805                 810                 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
            820                 825                 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
        835                 840                 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
    850                 855                 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865                 870                 875                 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
                885                 890                 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
        915                 920                 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
                965                 970                 975
```

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```
Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Ile  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050

Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
    1055                1060                1065

Asn Leu  Thr Thr Ala Thr Thr  Ala Ile Ile Thr Ser  Ser Leu Gly
    1070                1075                1080

Val Ala  Ser Gly Phe Ser Ile  Leu Leu Val Pro Leu  Ala Gly Ile
    1085                1090                1095

Ser Ala  Gly Ile Pro Ser Leu  Val Asn Asn Glu Leu  Val Leu Arg
    1100                1105                1110

Asp Lys  Ala Thr Lys Val Val  Asp Tyr Phe Lys His  Val Ser Leu
    1115                1120                1125

Val Glu  Thr Glu Gly Val Phe  Thr Leu Leu Asp Asp  Lys Ile Met
    1130                1135                1140

Met Pro  Gln Asp Asp Leu Val  Ile Ser Glu Ile Asp  Phe Asn Asn
    1145                1150                1155

Asn Ser  Ile Val Leu Gly Lys  Cys Glu Ile Trp Arg  Met Glu Gly
    1160                1165                1170
```

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Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

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Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile Leu
1370 1375 1380

Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys Thr
1535 1540 1545

Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala Glu
1550 1555 1560

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Ile Leu Lys Phe Met Asn Arg Lys Gly Asn Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe
1580 1585 1590

Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

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Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

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Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Tyr Lys Tyr Tyr Phe Asn Ser Asp Gly Val
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

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Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

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Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 738
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 738

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val

```
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Gly Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
```

340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
530 535 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr

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545                 550                 555                 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
            580                 585                 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
        595                 600                 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
    610                 615                 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625                 630                 635                 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
                645                 650                 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
            660                 665                 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
        675                 680                 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
    690                 695                 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705                 710                 715                 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
                725                 730                 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
            740                 745                 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
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```
        755                 760                 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
    770                 775                 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785                 790                 795                 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
                805                 810                 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
            820                 825                 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
        835                 840                 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
    850                 855                 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865                 870                 875                 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
                885                 890                 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
        915                 920                 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
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                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Ile  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050

Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
    1055                1060                1065

Asn Leu  Thr Thr Ala Thr Thr  Ala Ile Ile Thr Ser  Ser Leu Gly
    1070                1075                1080

Val Ala  Ser Gly Phe Ser Ile  Leu Leu Val Pro Leu  Ala Gly Ile
    1085                1090                1095

Ser Ala  Gly Ile Pro Ser Leu  Val Asn Asn Glu Leu  Val Leu Arg
    1100                1105                1110

Asp Lys  Ala Thr Lys Val Val  Asp Tyr Phe Lys His  Val Ser Leu
    1115                1120                1125

Val Glu  Thr Glu Gly Val Phe  Thr Leu Leu Asp Asp  Lys Ile Met
    1130                1135                1140

Met Pro  Gln Asp Asp Leu Val  Ile Ser Glu Ile Asp  Phe Asn Asn
    1145                1150                1155

Asn Ser  Ile Val Leu Gly Lys  Cys Glu Ile Trp Arg  Met Glu Gly
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1160 1165 1170

Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu

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1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile Leu
1370 1375 1380

Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys Thr
1535 1540 1545

Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala Glu

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1550 1555 1560

Ile Leu Lys Phe Met Asn Arg Lys Gly Asn Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe
1580 1585 1590

Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys

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1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu

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1940 1945 1950

Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Tyr Lys Tyr Tyr Phe Asn Ser Asp Gly Val
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe

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2135 2140 2145

Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly

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2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 739
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 739

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

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Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Gly Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335
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Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540
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Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545                 550                 555                 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
            580                 585                 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
        595                 600                 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
    610                 615                 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625                 630                 635                 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
                645                 650                 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
            660                 665                 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
        675                 680                 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
    690                 695                 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705                 710                 715                 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
                725                 730                 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
            740                 745                 750
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```
Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
        755                 760                 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
    770                 775                 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785                 790                 795                 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
                805                 810                 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
            820                 825                 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
        835                 840                 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
    850                 855                 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865                 870                 875                 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
                885                 890                 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
        915                 920                 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960
```

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```
Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
               965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
           980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Ile  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050

Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
    1055                1060                1065

Asn Leu  Thr Thr Ala Thr Thr  Ala Ile Ile Thr Ser  Ser Leu Gly
    1070                1075                1080

Val Ala  Ser Gly Phe Ser Ile  Leu Leu Val Pro Leu  Ala Gly Ile
    1085                1090                1095

Ser Ala  Gly Ile Pro Ser Leu  Val Asn Asn Glu Leu  Val Leu Arg
    1100                1105                1110

Asp Lys  Ala Thr Lys Val Val  Asp Tyr Phe Lys His  Val Ser Leu
    1115                1120                1125

Val Glu  Thr Glu Gly Val Phe  Thr Leu Leu Asp Asp  Lys Ile Met
    1130                1135                1140

Met Pro  Gln Asp Asp Leu Val  Ile Ser Glu Ile Asp  Phe Asn Asn
    1145                1150                1155
```

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```
Asn Ser  Ile Val Leu Gly Lys  Cys Glu Ile Trp Arg  Met Glu Gly
    1160                 1165                 1170

Gly Ser  Gly His Thr Val Thr  Asp Asp Ile Asp His  Phe Phe Ser
    1175                 1180                 1185

Ala Pro  Ser Ile Thr Tyr Arg  Glu Pro His Leu Ser  Ile Tyr Asp
    1190                 1195                 1200

Val Leu  Glu Val Gln Lys Glu  Glu Leu Asp Leu Ser  Lys Asp Leu
    1205                 1210                 1215

Met Val  Leu Pro Asn Ala Pro  Asn Arg Val Phe Ala  Trp Glu Thr
    1220                 1225                 1230

Gly Trp  Thr Pro Gly Leu Arg  Ser Leu Glu Asn Asp  Gly Thr Lys
    1235                 1240                 1245

Leu Leu  Asp Arg Ile Arg Asp  Asn Tyr Glu Gly Glu  Phe Tyr Trp
    1250                 1255                 1260

Arg Tyr  Phe Ala Phe Ile Ala  Asp Ala Leu Ile Thr  Thr Leu Lys
    1265                 1270                 1275

Pro Arg  Tyr Glu Asp Thr Asn  Ile Arg Ile Asn Leu  Asp Ser Asn
    1280                 1285                 1290

Thr Arg  Ser Phe Ile Val Pro  Ile Ile Thr Thr Glu  Tyr Ile Arg
    1295                 1300                 1305

Glu Lys  Leu Ser Tyr Ser Phe  Tyr Gly Ser Gly Gly  Thr Tyr Ala
    1310                 1315                 1320

Leu Ser  Leu Ser Gln Tyr Asn  Met Gly Ile Asn Ile  Glu Leu Ser
    1325                 1330                 1335

Glu Ser  Asp Val Trp Ile Ile  Asp Val Asp Asn Val  Val Arg Asp
    1340                 1345                 1350
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```
Val Thr  Ile Glu Ser Asp Lys  Ile Lys Lys Gly Asp  Leu Ile Glu
    1355                1360                1365

Gly Ile  Leu Ser Thr Leu Ser  Ile Glu Glu Asn Lys  Ile Ile Leu
    1370                1375                1380

Asn Ser  His Glu Ile Asn Phe  Ser Gly Glu Val Asn  Gly Ser Asn
    1385                1390                1395

Gly Phe  Val Ser Leu Thr Phe  Ser Ile Leu Glu Gly  Ile Asn Ala
    1400                1405                1410

Ile Ile  Glu Val Asp Leu Leu  Ser Lys Ser Tyr Lys  Leu Leu Ile
    1415                1420                1425

Ser Gly  Glu Leu Lys Ile Leu  Met Leu Asn Ser Asn  His Ile Gln
    1430                1435                1440

Gln Lys  Ile Asp Tyr Ile Gly  Phe Asn Ser Glu Leu  Gln Lys Asn
    1445                1450                1455

Ile Pro  Tyr Ser Phe Val Asp  Ser Glu Gly Lys Glu  Asn Gly Phe
    1460                1465                1470

Ile Asn  Gly Ser Thr Lys Glu  Gly Leu Phe Val Ser  Glu Leu Pro
    1475                1480                1485

Asp Val  Val Leu Ile Ser Lys  Val Tyr Met Asp Asp  Ser Lys Pro
    1490                1495                1500

Ser Phe  Gly Tyr Tyr Ser Asn  Asn Leu Lys Asp Val  Lys Val Ile
    1505                1510                1515

Thr Lys  Asp Asn Val Asn Ile  Leu Thr Gly Tyr Tyr  Leu Lys Asp
    1520                1525                1530

Asp Ile  Lys Ile Ser Leu Ser  Leu Thr Leu Gln Asp  Glu Lys Thr
    1535                1540                1545
```

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```
Ile Lys  Leu Asn Ser Val His  Leu Asp Glu Ser Gly  Val Ala Glu
    1550                1555                1560

Ile Leu  Lys Phe Met Asn Arg  Lys Gly Asn Thr Asn  Thr Ser Asp
    1565                1570                1575

Ser Leu  Met Ser Phe Leu Glu  Ser Met Asn Ile Lys  Ser Ile Phe
    1580                1585                1590

Val Asn  Phe Leu Gln Ser Asn  Ile Lys Phe Ile Leu  Asp Ala Asn
    1595                1600                1605

Phe Ile  Ile Ser Gly Thr Thr  Ser Ile Gly Gln Phe  Glu Phe Ile
    1610                1615                1620

Cys Asp  Glu Asn Asp Asn Ile  Gln Pro Tyr Phe Ile  Lys Phe Asn
    1625                1630                1635

Thr Leu  Glu Thr Asn Tyr Thr  Leu Tyr Val Gly Asn  Arg Gln Asn
    1640                1645                1650

Met Ile  Val Glu Pro Asn Tyr  Asp Leu Asp Asp Ser  Gly Asp Ile
    1655                1660                1665

Ser Ser  Thr Val Ile Asn Phe  Ser Gln Lys Tyr Leu  Tyr Gly Ile
    1670                1675                1680

Asp Ser  Cys Val Asn Lys Val  Val Ile Ser Pro Asn  Ile Tyr Thr
    1685                1690                1695

Asp Glu  Ile Asn Ile Thr Pro  Val Tyr Glu Thr Asn  Asn Thr Tyr
    1700                1705                1710

Pro Glu  Val Ile Val Leu Asp  Ala Asn Tyr Ile Asn  Glu Lys Ile
    1715                1720                1725

Asn Val  Asn Ile Asn Asp Leu  Ser Ile Arg Tyr Val  Trp Ser Asn
    1730                1735                1740
```

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```
Asp Gly  Asn Asp Phe Ile Leu  Met Ser Thr Ser Glu  Glu Asn Lys
    1745                1750                1755

Val Ser  Gln Val Lys Ile Arg  Phe Val Asn Val Phe  Lys Asp Lys
    1760                1765                1770

Thr Leu  Ala Asn Lys Leu Ser  Phe Asn Phe Ser Asp  Lys Gln Asp
    1775                1780                1785

Val Pro  Val Ser Glu Ile Ile  Leu Ser Phe Thr Pro  Ser Tyr Tyr
    1790                1795                1800

Glu Asp  Gly Leu Ile Gly Tyr  Asp Leu Gly Leu Val  Ser Leu Tyr
    1805                1810                1815

Asn Glu  Lys Phe Tyr Ile Asn  Asn Phe Gly Met Met  Val Ser Gly
    1820                1825                1830

Leu Ile  Tyr Ile Asn Asp Ser  Leu Tyr Tyr Phe Lys  Pro Pro Val
    1835                1840                1845

Asn Asn  Leu Ile Thr Gly Phe  Val Thr Val Gly Asp  Asp Lys Tyr
    1850                1855                1860

Tyr Phe  Asn Pro Ile Asn Gly  Gly Ala Ala Ser Ile  Gly Glu Thr
    1865                1870                1875

Ile Ile  Asp Asp Lys Asn Tyr  Tyr Phe Asn Gln Ser  Gly Val Leu
    1880                1885                1890

Gln Thr  Gly Val Phe Ser Thr  Glu Asp Gly Phe Lys  Tyr Phe Ala
    1895                1900                1905

Pro Ala  Asn Thr Leu Asp Glu  Asn Leu Glu Gly Glu  Ala Ile Asp
    1910                1915                1920

Phe Thr  Gly Lys Leu Ile Ile  Asp Glu Asn Ile Tyr  Tyr Phe Asp
    1925                1930                1935
```

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Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Tyr Lys Tyr Tyr Phe Asn Ser Asp Gly Val
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

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```
Gly Ile  Ile Glu Ser Gly Val  Gln Asn Ile Asp Asp  Asn Tyr Phe
    2135                2140                2145

Tyr Ile  Asp Asp Asn Gly Ile  Val Gln Ile Gly Val  Phe Asp Thr
    2150                2155                2160

Ser Asp  Gly Tyr Lys Tyr Phe  Ala Pro Ala Asn Thr  Val Asn Asp
    2165                2170                2175

Asn Ile  Tyr Gly Gln Ala Val  Glu Tyr Ser Gly Leu  Val Arg Val
    2180                2185                2190

Gly Glu  Asp Val Tyr Tyr Phe  Gly Glu Thr Tyr Thr  Ile Glu Thr
    2195                2200                2205

Gly Trp  Ile Tyr Asp Met Glu  Asn Glu Ser Asp Lys  Tyr Tyr Phe
    2210                2215                2220

Asn Pro  Glu Thr Lys Lys Ala  Cys Lys Gly Ile Asn  Leu Ile Asp
    2225                2230                2235

Asp Ile  Lys Tyr Tyr Phe Asp  Glu Lys Gly Ile Met  Arg Thr Gly
    2240                2245                2250

Leu Ile  Ser Phe Glu Asn Asn  Asn Tyr Tyr Phe Asn  Glu Asn Gly
    2255                2260                2265

Glu Met  Gln Phe Gly Tyr Ile  Asn Ile Glu Asp Lys  Met Phe Tyr
    2270                2275                2280

Phe Gly  Glu Asp Gly Val Met  Gln Ile Gly Val Phe  Asn Thr Pro
    2285                2290                2295

Asp Gly  Phe Lys Tyr Phe Ala  His Gln Asn Thr Leu  Asp Glu Asn
    2300                2305                2310

Phe Glu  Gly Glu Ser Ile Asn  Tyr Thr Gly Trp Leu  Asp Leu Asp
    2315                2320                2325
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Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 740
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 740

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val

115 120 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
130 135 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145 150 155 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
165 170 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
180 185 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
195 200 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
210 215 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225 230 235 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
260 265 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Ala Val Ala Met
275 280 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
290 295 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met

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325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu

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530 535 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545 550 555 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
565 570 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
580 585 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
595 600 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
610 615 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625 630 635 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
645 650 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
660 665 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
675 680 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
690 695 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705 710 715 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
725 730 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu

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740 745 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
755 760 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
770 775 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785 790 795 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
805 810 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
820 825 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
835 840 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
850 855 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865 870 875 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
885 890 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
900 905 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
915 920 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
930 935 940

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala

945 950 955 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
965 970 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
980 985 990

Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp Ala Ala Lys Val Val Glu
995 1000 1005

Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu Pro Thr
1010 1015 1020

Leu Ser Glu Gly Leu Pro Ile Ile Ala Thr Ile Ile Asp Gly Val
1025 1030 1035

Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp Pro
1040 1045 1050

Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala Val
1055 1060 1065

Asn Leu Thr Thr Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu Gly
1070 1075 1080

Val Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile
1085 1090 1095

Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg
1100 1105 1110

Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Val Ser Leu
1115 1120 1125

Val Glu Thr Glu Gly Val Phe Thr Leu Leu Asp Asp Lys Ile Met
1130 1135 1140

Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn

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1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp

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1340 1345 1350

Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile Leu
1370 1375 1380

Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys Thr

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1535 1540 1545

Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Arg Lys Gly Asn Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe
1580 1585 1590

Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn

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1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp

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1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Tyr Lys Tyr Tyr Phe Asn Ser Asp Gly Val
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser

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2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp

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2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 741
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 741

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
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Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

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```
Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320
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Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
        515                 520                 525
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```
Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545                 550                 555                 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
            580                 585                 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
        595                 600                 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
    610                 615                 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625                 630                 635                 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
                645                 650                 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
            660                 665                 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
        675                 680                 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
    690                 695                 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705                 710                 715                 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
                725                 730                 735
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```
Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
            740                 745                 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
        755                 760                 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
    770                 775                 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785                 790                 795                 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
                805                 810                 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
            820                 825                 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
        835                 840                 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
    850                 855                 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865                 870                 875                 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
                885                 890                 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
        915                 920                 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940
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```
Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Ile  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050

Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
    1055                1060                1065

Asn Leu  Thr Thr Ala Thr Thr  Ala Ile Ile Thr Ser  Ser Leu Gly
    1070                1075                1080

Val Ala  Ser Gly Phe Ser Ile  Leu Leu Val Pro Leu  Ala Gly Ile
    1085                1090                1095

Ser Ala  Gly Ile Pro Ser Leu  Val Asn Asn Glu Leu  Val Leu Arg
    1100                1105                1110

Asp Lys  Ala Thr Lys Val Val  Asp Tyr Phe Lys His  Val Ser Leu
    1115                1120                1125

Val Glu  Thr Glu Gly Val Phe  Thr Leu Leu Asp Asp  Lys Ile Met
    1130                1135                1140
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```
Met Pro  Gln Asp Asp Leu Val  Ile Ser Glu Ile Asp  Phe Asn Asn
    1145                1150                1155

Asn Ser  Ile Val Leu Gly Lys  Cys Glu Ile Trp Arg  Met Glu Gly
    1160                1165                1170

Gly Ser  Gly His Thr Val Thr  Asp Asp Ile Asp His  Phe Phe Ser
    1175                1180                1185

Ala Pro  Ser Ile Thr Tyr Arg  Glu Pro His Leu Ser  Ile Tyr Asp
    1190                1195                1200

Val Leu  Glu Val Gln Lys Glu  Glu Leu Asp Leu Ser  Lys Asp Leu
    1205                1210                1215

Met Val  Leu Pro Asn Ala Pro  Asn Arg Val Phe Ala  Trp Glu Thr
    1220                1225                1230

Gly Trp  Thr Pro Gly Leu Arg  Ser Leu Glu Asn Asp  Gly Thr Lys
    1235                1240                1245

Leu Leu  Asp Arg Ile Arg Asp  Asn Tyr Glu Gly Glu  Phe Tyr Trp
    1250                1255                1260

Arg Tyr  Phe Ala Phe Ile Ala  Asp Ala Leu Ile Thr  Thr Leu Lys
    1265                1270                1275

Pro Arg  Tyr Glu Asp Thr Asn  Ile Arg Ile Asn Leu  Asp Ser Asn
    1280                1285                1290

Thr Arg  Ser Phe Ile Val Pro  Ile Ile Thr Thr Glu  Tyr Ile Arg
    1295                1300                1305

Glu Lys  Leu Ser Tyr Ser Phe  Tyr Gly Ser Gly Gly  Thr Tyr Ala
    1310                1315                1320

Leu Ser  Leu Ser Gln Tyr Asn  Met Gly Ile Asn Ile  Glu Leu Ser
    1325                1330                1335
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Glu Ser  Asp Val Trp Ile Ile  Asp Val Asp Asn Val  Val Arg Asp
    1340                1345                1350

Val Thr  Ile Glu Ser Asp Lys  Ile Lys Lys Gly Asp  Leu Ile Glu
    1355                1360                1365

Gly Ile  Leu Ser Thr Leu Ser  Ile Glu Glu Asn Lys  Ile Ile Leu
    1370                1375                1380

Asn Ser  His Glu Ile Asn Phe  Ser Gly Glu Val Asn  Gly Ser Asn
    1385                1390                1395

Gly Phe  Val Ser Leu Thr Phe  Ser Ile Leu Glu Gly  Ile Asn Ala
    1400                1405                1410

Ile Ile  Glu Val Asp Leu Leu  Ser Lys Ser Tyr Lys  Leu Leu Ile
    1415                1420                1425

Ser Gly  Glu Leu Lys Ile Leu  Met Leu Asn Ser Asn  His Ile Gln
    1430                1435                1440

Gln Lys  Ile Asp Tyr Ile Gly  Phe Asn Ser Glu Leu  Gln Lys Asn
    1445                1450                1455

Ile Pro  Tyr Ser Phe Val Asp  Ser Glu Gly Lys Glu  Asn Gly Phe
    1460                1465                1470

Ile Asn  Gly Ser Thr Lys Glu  Gly Leu Phe Val Ser  Glu Leu Pro
    1475                1480                1485

Asp Val  Val Leu Ile Ser Lys  Val Tyr Met Asp Asp  Ser Lys Pro
    1490                1495                1500

Ser Phe  Gly Tyr Tyr Ser Asn  Asn Leu Lys Asp Val  Lys Val Ile
    1505                1510                1515

Thr Lys  Asp Asn Val Asn Ile  Leu Thr Gly Tyr Tyr  Leu Lys Asp
    1520                1525                1530
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Asp Ile  Lys Ile Ser Leu Ser  Leu Thr Leu Gln Asp  Glu Lys Thr
    1535                1540                1545

Ile Lys  Leu Asn Ser Val His  Leu Asp Glu Ser Gly  Val Ala Glu
    1550                1555                1560

Ile Leu  Lys Phe Met Asn Arg  Lys Gly Ser Thr Asn  Thr Ser Asp
    1565                1570                1575

Ser Leu  Met Ser Phe Leu Glu  Ser Met Asn Ile Lys  Ser Ile Phe
    1580                1585                1590

Val Asn  Phe Leu Gln Ser Asn  Ile Lys Phe Ile Leu  Asp Ala Asn
    1595                1600                1605

Phe Ile  Ile Ser Gly Thr Thr  Ser Ile Gly Gln Phe  Glu Phe Ile
    1610                1615                1620

Cys Asp  Glu Asn Asp Asn Ile  Gln Pro Tyr Phe Ile  Lys Phe Asn
    1625                1630                1635

Thr Leu  Glu Thr Asn Tyr Thr  Leu Tyr Val Gly Asn  Arg Gln Asn
    1640                1645                1650

Met Ile  Val Glu Pro Asn Tyr  Asp Leu Asp Asp Ser  Gly Asp Ile
    1655                1660                1665

Ser Ser  Thr Val Ile Asn Phe  Ser Gln Lys Tyr Leu  Tyr Gly Ile
    1670                1675                1680

Asp Ser  Cys Val Asn Lys Val  Val Ile Ser Pro Asn  Ile Tyr Thr
    1685                1690                1695

Asp Glu  Ile Asn Ile Thr Pro  Val Tyr Glu Thr Asn  Asn Thr Tyr
    1700                1705                1710

Pro Glu  Val Ile Val Leu Asp  Ala Asn Tyr Ile Asn  Glu Lys Ile
    1715                1720                1725
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```
Asn Val  Asn Ile Asn Asp Leu  Ser Ile Arg Tyr Val  Trp Ser Asn
    1730                1735                1740

Asp Gly  Asn Asp Phe Ile Leu  Met Ser Thr Ser Glu  Glu Asn Lys
    1745                1750                1755

Val Ser  Gln Val Lys Ile Arg  Phe Val Asn Val Phe  Lys Asp Lys
    1760                1765                1770

Thr Leu  Ala Asn Lys Leu Ser  Phe Asn Phe Ser Asp  Lys Gln Asp
    1775                1780                1785

Val Pro  Val Ser Glu Ile Ile  Leu Ser Phe Thr Pro  Ser Tyr Tyr
    1790                1795                1800

Glu Asp  Gly Leu Ile Gly Tyr  Asp Leu Gly Leu Val  Ser Leu Tyr
    1805                1810                1815

Asn Glu  Lys Phe Tyr Ile Asn  Asn Phe Gly Met Met  Val Ser Gly
    1820                1825                1830

Leu Ile  Tyr Ile Asn Asp Ser  Leu Tyr Tyr Phe Lys  Pro Pro Val
    1835                1840                1845

Asn Asn  Leu Ile Thr Gly Phe  Val Thr Val Gly Asp  Asp Lys Tyr
    1850                1855                1860

Tyr Phe  Asn Pro Ile Asn Gly  Gly Ala Ala Ser Ile  Gly Glu Thr
    1865                1870                1875

Ile Ile  Asp Asp Lys Asn Tyr  Tyr Phe Asn Gln Ser  Gly Val Leu
    1880                1885                1890

Gln Thr  Gly Val Phe Ser Thr  Glu Asp Gly Phe Lys  Tyr Phe Ala
    1895                1900                1905

Pro Ala  Asn Thr Leu Asp Glu  Asn Leu Glu Gly Glu  Ala Ile Asp
    1910                1915                1920
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Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Val
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

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Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

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Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 742
<211> 2366
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 742

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Val Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Thr Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Ile
65 70 75 80

Glu Ile Leu Glu Leu Lys Asn Ser Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Ile Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn

```
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Ile Glu Ser Ala Ser Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Glu Phe Asn His Thr Ala Phe Phe Arg Lys Arg Met Gln
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Gln Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Lys Glu Glu Asn Pro Asp Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Asp Ile Asp Glu Leu Asn Ala Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Val Thr Glu Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Thr Gly Glu Val Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Gly Ala Ser Asp Ile Leu Arg
            260                 265                 270

Val Ala Ile Leu Lys Asn Ile Gly Gly Val Tyr Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile His Pro Asp Leu Phe Lys Asp Ile Asn Lys Pro Asp
    290                 295                 300

Ser Val Lys Thr Ala Val Asp Trp Glu Glu Met Gln Leu Glu Ala Ile
```

305 310 315 320

Met Lys His Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Lys His Phe Asp
325 330 335

Thr Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
340 345 350

Lys Ser Asp Lys Ser Glu Ile Phe Leu Pro Leu Gly Asp Ile Glu Val
355 360 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Ala Lys Gly Ser Ile Ile Asn
370 375 380

Gln Ala Leu Ile Ser Ala Lys Asp Ser Tyr Cys Ser Asp Leu Leu Ile
385 390 395 400

Lys Gln Ile Gln Asn Arg Tyr Lys Ile Leu Asn Asp Thr Leu Gly Pro
405 410 415

Ile Ile Ser Gln Gly Asn Asp Phe Asn Thr Thr Met Asn Asn Phe Gly
420 425 430

Glu Ser Leu Gly Ala Ile Ala Asn Glu Glu Asn Ile Ser Phe Ile Ala
435 440 445

Lys Ile Gly Ser Tyr Leu Arg Val Gly Phe Tyr Pro Glu Ala Asn Thr
450 455 460

Thr Ile Thr Leu Ser Gly Pro Thr Ile Tyr Ala Gly Ala Tyr Lys Asp
465 470 475 480

Leu Leu Thr Phe Lys Glu Met Ser Ile Asp Thr Ser Ile Leu Ser Ser
485 490 495

Glu Leu Arg Asn Phe Glu Phe Pro Lys Val Asn Ile Ser Gln Ala Thr
500 505 510

Glu Gln Glu Lys Asn Ser Leu Trp Gln Phe Asn Glu Glu Arg Ala Lys

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515 520 525

Ile Gln Phe Glu Glu Tyr Lys Lys Asn Tyr Phe Glu Gly Ala Leu Gly
530 535 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Thr Val Thr Asp Lys Glu
545 550 555 560

Tyr Leu Leu Glu Lys Ile Ser Ser Ser Thr Lys Ser Ser Glu Arg Gly
565 570 575

Tyr Val His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
580 585 590

Ala Ala Cys Asn Leu Phe Ala Lys Asn Pro Tyr Asp Ser Ile Leu Phe
595 600 605

Gln Lys Asn Ile Glu Asp Ser Glu Val Ala Tyr Tyr Tyr Asn Pro Thr
610 615 620

Asp Ser Glu Ile Gln Glu Ile Asp Lys Tyr Arg Ile Pro Asp Arg Ile
625 630 635 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Ala
645 650 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser
660 665 670

Ser Glu Ile Glu Thr Ala Ile Gly Leu Ala Lys Glu Asp Ile Ser Pro
675 680 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser
690 695 700

Val Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Arg Val Lys
705 710 715 720

Asp Lys Val Ser Glu Leu Met Pro Ser Met Ser Gln Asp Ser Ile Ile

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725 730 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg
740 745 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
755 760 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
770 775 780

Asn Lys Ile Ile Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785 790 795 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu
805 810 815

Glu Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
820 825 830

Glu Thr Gln Val Val Glu Glu Arg Ile Glu Glu Ala Lys Ser Leu Thr
835 840 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser
850 855 860

Ile Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp
865 870 875 880

Ser His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe
885 890 895

Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
900 905 910

Thr Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu
915 920 925

Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu

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930 935 940

Val Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn
945 950 955 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu
965 970 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
980 985 990

Leu Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp Ala Ala Lys Val Val
995 1000 1005

Glu Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu Pro
1010 1015 1020

Thr Leu Ser Glu Gly Leu Pro Ile Ile Ala Thr Ile Ile Asp Gly
1025 1030 1035

Val Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp
1040 1045 1050

Pro Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala
1055 1060 1065

Val Asn Leu Thr Thr Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu
1070 1075 1080

Gly Ile Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly
1085 1090 1095

Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu
1100 1105 1110

Arg Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Val Ser
1115 1120 1125

Leu Val Glu Thr Glu Gly Val Phe Thr Leu Leu Asp Asp Lys Val

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    1130                1135                1140

Met Met  Pro Gln Asp Asp Leu  Val Ile Ser Glu Ile  Asp Phe Asn
    1145                1150                1155

Asn Asn  Ser Ile Val Leu Gly  Lys Cys Glu Ile Trp  Arg Met Glu
    1160                1165                1170

Gly Gly  Ser Gly His Thr Val  Thr Asp Asp Ile Asp  His Phe Phe
    1175                1180                1185

Ser Ala  Pro Ser Ile Thr Tyr  Arg Glu Pro His Leu  Ser Ile Tyr
    1190                1195                1200

Asp Val  Leu Glu Val Gln Lys  Glu Glu Leu Asp Leu  Ser Lys Asp
    1205                1210                1215

Leu Met  Val Leu Pro Asn Ala  Pro Asn Arg Val Phe  Ala Trp Glu
    1220                1225                1230

Thr Gly  Trp Thr Pro Gly Leu  Arg Ser Leu Glu Asn  Asp Gly Thr
    1235                1240                1245

Lys Leu  Leu Asp Arg Ile Arg  Asp Asn Tyr Glu Gly  Glu Phe Tyr
    1250                1255                1260

Trp Arg  Tyr Phe Ala Phe Ile  Ala Asp Ala Leu Ile  Thr Thr Leu
    1265                1270                1275

Lys Pro  Arg Tyr Glu Asp Thr  Asn Ile Arg Ile Asn  Leu Asp Ser
    1280                1285                1290

Asn Thr  Arg Ser Phe Ile Val  Pro Ile Ile Thr Thr  Glu Tyr Ile
    1295                1300                1305

Arg Glu  Lys Leu Ser Tyr Ser  Phe Tyr Gly Ser Gly  Gly Thr Tyr
    1310                1315                1320

Ala Leu  Ser Leu Ser Gln Tyr  Asn Met Gly Ile Asn  Ile Glu Leu
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1325 1330 1335

Ser Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg
1340 1345 1350

Asp Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile
1355 1360 1365

Glu Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile
1370 1375 1380

Leu Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser
1385 1390 1395

Asn Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn
1400 1405 1410

Ala Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu
1415 1420 1425

Ile Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile
1430 1435 1440

Gln Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys
1445 1450 1455

Asn Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly
1460 1465 1470

Phe Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu
1475 1480 1485

Pro Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys
1490 1495 1500

Pro Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val
1505 1510 1515

Ile Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys

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1520 1525 1530

Asp Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys
1535 1540 1545

Thr Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala
1550 1555 1560

Glu Ile Leu Lys Phe Met Asn Arg Lys Gly Ser Thr Asn Thr Ser
1565 1570 1575

Asp Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile
1580 1585 1590

Phe Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala
1595 1600 1605

Asn Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe
1610 1615 1620

Ile Cys Asp Glu Asn Asn Asn Ile Gln Pro Tyr Phe Ile Lys Phe
1625 1630 1635

Asn Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln
1640 1645 1650

Asn Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp
1655 1660 1665

Ile Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly
1670 1675 1680

Ile Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr
1685 1690 1695

Thr Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr
1700 1705 1710

Tyr Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys

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1715 1720 1725

Ile Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser
1730 1735 1740

Asn Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn
1745 1750 1755

Lys Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp
1760 1765 1770

Lys Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln
1775 1780 1785

Asp Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr
1790 1795 1800

Tyr Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu
1805 1810 1815

Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser
1820 1825 1830

Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro
1835 1840 1845

Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys
1850 1855 1860

Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu
1865 1870 1875

Thr Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val
1880 1885 1890

Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
1895 1900 1905

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile

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1910 1915 1920

Asp Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe
1925 1930 1935

Glu Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly
1940 1945 1950

Glu Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly
1955 1960 1965

Leu Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly
1970 1975 1980

Val Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr
1985 1990 1995

Phe Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp
2000 2005 2010

Gly Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly
2015 2020 2025

Val Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn
2030 2035 2040

Glu Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly
2045 2050 2055

Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe
2060 2065 2070

Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr
2075 2080 2085

Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu
2090 2095 2100

Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln

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2105 2110 2115

Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp
2120 2125 2130

Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr
2135 2140 2145

Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp
2150 2155 2160

Thr Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn
2165 2170 2175

Asp Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg
2180 2185 2190

Val Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu
2195 2200 2205

Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr
2210 2215 2220

Phe Asp Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile
2225 2230 2235

Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr
2240 2245 2250

Gly Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn
2255 2260 2265

Gly Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe
2270 2275 2280

Tyr Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr
2285 2290 2295

Pro Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu

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2300 2305 2310

Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu
2315 2320 2325

Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr
2330 2335 2340

Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp
2345 2350 2355

Thr Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 743
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 743

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

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```
Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300
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Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510
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Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ser Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
530 535 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545 550 555 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
565 570 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
580 585 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
595 600 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
610 615 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625 630 635 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
645 650 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
660 665 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
675 680 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
690 695 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705 710 715 720

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```
Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
                725                 730                 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
            740                 745                 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
        755                 760                 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
    770                 775                 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785                 790                 795                 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
                805                 810                 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
            820                 825                 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
        835                 840                 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
    850                 855                 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865                 870                 875                 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
                885                 890                 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
        915                 920                 925
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Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Ile  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050

Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
    1055                1060                1065

Asn Leu  Thr Thr Ala Thr Thr  Ala Ile Ile Thr Ser  Ser Leu Gly
    1070                1075                1080

Val Ala  Ser Gly Phe Ser Ile  Leu Leu Val Pro Leu  Ala Gly Ile
    1085                1090                1095

Ser Ala  Gly Ile Pro Ser Leu  Val Asn Asn Glu Leu  Val Leu Arg
    1100                1105                1110

Asp Lys  Ala Thr Lys Val Val  Asp Tyr Phe Lys His  Val Ser Leu
    1115                1120                1125
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Val Glu Thr Glu Gly Val Phe Thr Leu Leu Asp Asp Lys Ile Met
1130 1135 1140

Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

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Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile Leu
1370 1375 1380

Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

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```
Thr Lys  Asp Asn Val Asn Ile  Leu Thr Gly Tyr Tyr  Leu Lys Asp
    1520                1525                1530

Asp Ile  Lys Ile Ser Leu Ser  Leu Thr Leu Gln Asp  Glu Lys Thr
    1535                1540                1545

Ile Lys  Leu Asn Ser Val His  Leu Asp Glu Ser Gly  Val Ala Glu
    1550                1555                1560

Ile Leu  Lys Phe Met Asn Arg  Lys Gly Ser Thr Asn  Thr Ser Asp
    1565                1570                1575

Ser Leu  Met Ser Phe Leu Glu  Ser Met Asn Ile Lys  Ser Ile Phe
    1580                1585                1590

Val Asn  Phe Leu Gln Ser Asn  Ile Lys Phe Ile Leu  Asp Ala Asn
    1595                1600                1605

Phe Ile  Ile Ser Gly Thr Thr  Ser Ile Gly Gln Phe  Glu Phe Ile
    1610                1615                1620

Cys Asp  Glu Asn Asp Asn Ile  Gln Pro Tyr Phe Ile  Lys Phe Asn
    1625                1630                1635

Thr Leu  Glu Thr Asn Tyr Thr  Leu Tyr Val Gly Asn  Arg Gln Asn
    1640                1645                1650

Met Ile  Val Glu Pro Asn Tyr  Asp Leu Asp Asp Ser  Gly Asp Ile
    1655                1660                1665

Ser Ser  Thr Val Ile Asn Phe  Ser Gln Lys Tyr Leu  Tyr Gly Ile
    1670                1675                1680

Asp Ser  Cys Val Asn Lys Val  Val Ile Ser Pro Asn  Ile Tyr Thr
    1685                1690                1695

Asp Glu  Ile Asn Ile Thr Pro  Val Tyr Glu Thr Asn  Asn Thr Tyr
    1700                1705                1710
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Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala
1895 1900 1905

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```
Pro Ala  Asn Thr Leu Asp Glu  Asn Leu Glu Gly Glu  Ala Ile Asp
    1910                1915                1920

Phe Thr  Gly Lys Leu Ile Ile  Asp Glu Asn Ile Tyr  Tyr Phe Asp
    1925                1930                1935

Asp Asn  Tyr Arg Gly Ala Val  Glu Trp Lys Glu Leu  Asp Gly Glu
    1940                1945                1950

Met His  Tyr Phe Ser Pro Glu  Thr Gly Lys Ala Phe  Lys Gly Leu
    1955                1960                1965

Asn Gln  Ile Gly Asp Asp Lys  Tyr Tyr Phe Asn Ser  Asp Gly Val
    1970                1975                1980

Met Gln  Lys Gly Phe Val Ser  Ile Asn Asp Asn Lys  His Tyr Phe
    1985                1990                1995

Asp Asp  Ser Gly Val Met Lys  Val Gly Tyr Thr Glu  Ile Asp Gly
    2000                2005                2010

Lys His  Phe Tyr Phe Ala Glu  Asn Gly Glu Met Gln  Ile Gly Val
    2015                2020                2025

Phe Asn  Thr Glu Asp Gly Phe  Lys Tyr Phe Ala His  His Asn Glu
    2030                2035                2040

Asp Leu  Gly Asn Glu Glu Gly  Glu Glu Ile Ser Tyr  Ser Gly Ile
    2045                2050                2055

Leu Asn  Phe Asn Asn Lys Ile  Tyr Tyr Phe Asp Asp  Ser Phe Thr
    2060                2065                2070

Ala Val  Val Gly Trp Lys Asp  Leu Glu Asp Gly Ser  Lys Tyr Tyr
    2075                2080                2085

Phe Asp  Glu Asp Thr Ala Glu  Ala Tyr Ile Gly Leu  Ser Leu Ile
    2090                2095                2100
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Asn Asp  Gly Gln Tyr Tyr Phe  Asn Asp Asp Gly Ile  Met Gln Val
    2105                 2110                 2115

Gly Phe  Val Thr Ile Asn Asp  Lys Val Phe Tyr Phe  Ser Asp Ser
    2120                 2125                 2130

Gly Ile  Ile Glu Ser Gly Val  Gln Asn Ile Asp Asp  Asn Tyr Phe
    2135                 2140                 2145

Tyr Ile  Asp Asp Asn Gly Ile  Val Gln Ile Gly Val  Phe Asp Thr
    2150                 2155                 2160

Ser Asp  Gly Tyr Lys Tyr Phe  Ala Pro Ala Asn Thr  Val Asn Asp
    2165                 2170                 2175

Asn Ile  Tyr Gly Gln Ala Val  Glu Tyr Ser Gly Leu  Val Arg Val
    2180                 2185                 2190

Gly Glu  Asp Val Tyr Tyr Phe  Gly Glu Thr Tyr Thr  Ile Glu Thr
    2195                 2200                 2205

Gly Trp  Ile Tyr Asp Met Glu  Asn Glu Ser Asp Lys  Tyr Tyr Phe
    2210                 2215                 2220

Asn Pro  Glu Thr Lys Lys Ala  Cys Lys Gly Ile Asn  Leu Ile Asp
    2225                 2230                 2235

Asp Ile  Lys Tyr Tyr Phe Asp  Glu Lys Gly Ile Met  Arg Thr Gly
    2240                 2245                 2250

Leu Ile  Ser Phe Glu Asn Asn  Asn Tyr Tyr Phe Asn  Glu Asn Gly
    2255                 2260                 2265

Glu Met  Gln Phe Gly Tyr Ile  Asn Ile Glu Asp Lys  Met Phe Tyr
    2270                 2275                 2280

Phe Gly  Glu Asp Gly Val Met  Gln Ile Gly Val Phe  Asn Thr Pro
    2285                 2290                 2295
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Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 744
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 744

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn

85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
130 135 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145 150 155 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
165 170 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
180 185 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
195 200 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
210 215 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225 230 235 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
260 265 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Ala Val Ala Met
275 280 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser

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    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
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500 505 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ser Arg Ala Lys Ala
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
530 535 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545 550 555 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
565 570 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
580 585 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
595 600 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
610 615 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625 630 635 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
645 650 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
660 665 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
675 680 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
690 695 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp

705 710 715 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
725 730 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
740 745 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
755 760 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
770 775 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785 790 795 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
805 810 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
820 825 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
835 840 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
850 855 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865 870 875 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
885 890 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
900 905 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile

915 920 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
930 935 940

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945 950 955 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
965 970 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
980 985 990

Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp Ala Ala Lys Val Val Glu
995 1000 1005

Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu Pro Thr
1010 1015 1020

Leu Ser Glu Gly Leu Pro Ile Ile Ala Thr Ile Ile Asp Gly Val
1025 1030 1035

Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp Pro
1040 1045 1050

Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala Val
1055 1060 1065

Asn Leu Thr Thr Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu Gly
1070 1075 1080

Val Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile
1085 1090 1095

Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg
1100 1105 1110

Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Val Ser Leu

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1115 1120 1125

Val Glu Thr Glu Gly Val Phe Thr Leu Leu Asp Asp Lys Ile Met
1130 1135 1140

Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala

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1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile Leu
1370 1375 1380

Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile

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1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys Thr
1535 1540 1545

Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Arg Lys Gly Ser Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe
1580 1585 1590

Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr Tyr

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1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala

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1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Val
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile

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2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro

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2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 745
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 745

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

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```
Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Ala Val Ala Met
        275                 280                 285
```

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```
Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495
```

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```
Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ser Arg Ala Lys Ala
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545                 550                 555                 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
            580                 585                 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
        595                 600                 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
    610                 615                 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625                 630                 635                 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
                645                 650                 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
            660                 665                 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
        675                 680                 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
    690                 695                 700
```

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```
Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705                 710                 715                 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
                725                 730                 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
            740                 745                 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
        755                 760                 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
    770                 775                 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785                 790                 795                 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
                805                 810                 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
            820                 825                 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
        835                 840                 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
    850                 855                 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865                 870                 875                 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
                885                 890                 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910
```

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```
Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
        915                 920                 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Ile  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050

Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
    1055                1060                1065

Asn Leu  Thr Thr Ala Thr Thr  Ala Ile Ile Thr Ser  Ser Leu Gly
    1070                1075                1080

Val Ala  Ser Gly Phe Ser Ile  Leu Leu Val Pro Leu  Ala Gly Ile
    1085                1090                1095

Ser Ala  Gly Ile Pro Ser Leu  Val Asn Asn Glu Leu  Val Leu Arg
    1100                1105                1110
```

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```
Asp Lys  Ala Thr Lys Val Val  Asp Tyr Phe Lys His  Val Ser Leu
    1115                1120                1125

Val Glu  Thr Glu Gly Val Phe  Thr Leu Leu Asp Asp  Lys Ile Met
    1130                1135                1140

Met Pro  Gln Asp Asp Leu Val  Ile Ser Glu Ile Asp  Phe Asn Asn
    1145                1150                1155

Asn Ser  Ile Val Leu Gly Lys  Cys Glu Ile Trp Arg  Met Glu Gly
    1160                1165                1170

Gly Ser  Gly His Thr Val Thr  Asp Asp Ile Asp His  Phe Phe Ser
    1175                1180                1185

Ala Pro  Ser Ile Thr Tyr Arg  Glu Pro His Leu Ser  Ile Tyr Asp
    1190                1195                1200

Val Leu  Glu Val Gln Lys Glu  Glu Leu Asp Leu Ser  Lys Asp Leu
    1205                1210                1215

Met Val  Leu Pro Asn Ala Pro  Asn Arg Val Phe Ala  Trp Glu Thr
    1220                1225                1230

Gly Trp  Thr Pro Gly Leu Arg  Ser Leu Glu Asn Asp  Gly Thr Lys
    1235                1240                1245

Leu Leu  Asp Arg Ile Arg Asp  Asn Tyr Glu Gly Glu  Phe Tyr Trp
    1250                1255                1260

Arg Tyr  Phe Ala Phe Ile Ala  Asp Ala Leu Ile Thr  Thr Leu Lys
    1265                1270                1275

Pro Arg  Tyr Glu Asp Thr Asn  Ile Arg Ile Asn Leu  Asp Ser Asn
    1280                1285                1290

Thr Arg  Ser Phe Ile Val Pro  Ile Ile Thr Thr Glu  Tyr Ile Arg
    1295                1300                1305
```

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Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile Leu
1370 1375 1380

Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

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```
Ser Phe  Gly Tyr Tyr Ser Asn  Asn Leu Lys Asp Val  Lys Val Ile
    1505                1510                1515

Thr Lys  Asp Asn Val Asn Ile  Leu Thr Gly Tyr Tyr  Leu Lys Asp
    1520                1525                1530

Asp Ile  Lys Ile Ser Leu Ser  Leu Thr Leu Gln Asp  Glu Lys Thr
    1535                1540                1545

Ile Lys  Leu Asn Ser Val His  Leu Asp Glu Ser Gly  Val Ala Glu
    1550                1555                1560

Ile Leu  Lys Phe Met Asn Arg  Lys Gly Ser Thr Asn  Thr Ser Asp
    1565                1570                1575

Ser Leu  Met Ser Phe Leu Glu  Ser Met Asn Ile Lys  Ser Ile Phe
    1580                1585                1590

Val Asn  Phe Leu Gln Ser Asn  Ile Lys Phe Ile Leu  Asp Ala Asn
    1595                1600                1605

Phe Ile  Ile Ser Gly Thr Thr  Ser Ile Gly Gln Phe  Glu Phe Ile
    1610                1615                1620

Cys Asp  Glu Asn Asp Asn Ile  Gln Pro Tyr Phe Ile  Lys Phe Asn
    1625                1630                1635

Thr Leu  Glu Thr Asn Tyr Thr  Leu Tyr Val Gly Asn  Arg Gln Asn
    1640                1645                1650

Met Ile  Val Glu Pro Asn Tyr  Asp Leu Asp Asp Ser  Gly Asp Ile
    1655                1660                1665

Ser Ser  Thr Val Ile Asn Phe  Ser Gln Lys Tyr Leu  Tyr Gly Ile
    1670                1675                1680

Asp Ser  Cys Val Asn Lys Val  Val Ile Ser Pro Asn  Ile Tyr Thr
    1685                1690                1695
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Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu
1880 1885 1890

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```
Gln Thr  Gly Val Phe Ser Thr  Glu Asp Gly Phe Lys  Tyr Phe Ala
    1895                1900                1905

Pro Ala  Asn Thr Leu Asp Glu  Asn Leu Glu Gly Glu  Ala Ile Asp
    1910                1915                1920

Phe Thr  Gly Lys Leu Ile Ile  Asp Glu Asn Ile Tyr  Tyr Phe Asp
    1925                1930                1935

Asp Asn  Tyr Arg Gly Ala Val  Glu Trp Lys Glu Leu  Asp Gly Glu
    1940                1945                1950

Met His  Tyr Phe Ser Pro Glu  Thr Gly Lys Ala Phe  Lys Gly Leu
    1955                1960                1965

Asn Gln  Ile Gly Asp Asp Lys  Tyr Tyr Phe Asn Ser  Asp Gly Val
    1970                1975                1980

Met Gln  Lys Gly Phe Val Ser  Ile Asn Asp Asn Lys  His Tyr Phe
    1985                1990                1995

Asp Asp  Ser Gly Val Met Lys  Val Gly Tyr Thr Glu  Ile Asp Gly
    2000                2005                2010

Lys His  Phe Tyr Phe Ala Glu  Asn Gly Glu Met Gln  Ile Gly Val
    2015                2020                2025

Phe Asn  Thr Glu Asp Gly Phe  Lys Tyr Phe Ala His  His Asn Glu
    2030                2035                2040

Asp Leu  Gly Asn Glu Glu Gly  Glu Glu Ile Ser Tyr  Ser Gly Ile
    2045                2050                2055

Leu Asn  Phe Asn Asn Lys Ile  Tyr Tyr Phe Asp Asp  Ser Phe Thr
    2060                2065                2070

Ala Val  Val Gly Trp Lys Asp  Leu Glu Asp Gly Ser  Lys Tyr Tyr
    2075                2080                2085
```

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```
Phe Asp  Glu Asp Thr Ala Glu  Ala Tyr Ile Gly Leu  Ser Leu Ile
    2090                 2095                 2100

Asn Asp  Gly Gln Tyr Tyr Phe  Asn Asp Asp Gly Ile  Met Gln Val
    2105                 2110                 2115

Gly Phe  Val Thr Ile Asn Asp  Lys Val Phe Tyr Phe  Ser Asp Ser
    2120                 2125                 2130

Gly Ile  Ile Glu Ser Gly Val  Gln Asn Ile Asp Asp  Asn Tyr Phe
    2135                 2140                 2145

Tyr Ile  Asp Asp Asn Gly Ile  Val Gln Ile Gly Val  Phe Asp Thr
    2150                 2155                 2160

Ser Asp  Gly Tyr Lys Tyr Phe  Ala Pro Ala Asn Thr  Val Asn Asp
    2165                 2170                 2175

Asn Ile  Tyr Gly Gln Ala Val  Glu Tyr Ser Gly Leu  Val Arg Val
    2180                 2185                 2190

Gly Glu  Asp Val Tyr Tyr Phe  Gly Glu Thr Tyr Thr  Ile Glu Thr
    2195                 2200                 2205

Gly Trp  Ile Tyr Asp Met Glu  Asn Glu Ser Asp Lys  Tyr Tyr Phe
    2210                 2215                 2220

Asn Pro  Glu Thr Lys Lys Ala  Cys Lys Gly Ile Asn  Leu Ile Asp
    2225                 2230                 2235

Asp Ile  Lys Tyr Tyr Phe Asp  Glu Lys Gly Ile Met  Arg Thr Gly
    2240                 2245                 2250

Leu Ile  Ser Phe Glu Asn Asn  Asn Tyr Tyr Phe Asn  Glu Asn Gly
    2255                 2260                 2265

Glu Met  Gln Phe Gly Tyr Ile  Asn Ile Glu Asp Lys  Met Phe Tyr
    2270                 2275                 2280
```

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Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 746
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 746

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr

65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
130 135 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145 150 155 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
165 170 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
180 185 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
195 200 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
210 215 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225 230 235 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
260 265 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Ala Val Ala Met

275 280 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
290 295 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp

```
485                 490                 495

Leu Arg Asn Phe Glu Ile Phe Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ser Arg Ala Lys Ala
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545                 550                 555                 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
            580                 585                 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
        595                 600                 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
    610                 615                 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625                 630                 635                 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
                645                 650                 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
            660                 665                 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
        675                 680                 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
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690 695 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705 710 715 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
725 730 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
740 745 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
755 760 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
770 775 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785 790 795 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
805 810 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
820 825 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
835 840 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
850 855 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865 870 875 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
885 890 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr

```
            900                 905                 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
        915                 920                 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Ile  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050

Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
    1055                1060                1065

Asn Leu  Thr Thr Ala Thr Thr  Ala Ile Ile Thr Ser  Ser Leu Gly
    1070                1075                1080

Val Ala  Ser Gly Phe Ser Ile  Leu Leu Val Pro Leu  Ala Gly Ile
    1085                1090                1095

Ser Ala  Gly Ile Pro Ser Leu  Val Asn Asn Glu Leu  Val Leu Arg
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    1100                1105                1110

Asp Lys  Ala Thr Lys Val Val  Asp Tyr Phe Lys His  Val Ser Leu
    1115                1120                1125

Val Glu  Thr Glu Gly Val Phe  Thr Leu Leu Asp Asp  Lys Ile Met
    1130                1135                1140

Met Pro  Gln Asp Asp Leu Val  Ile Ser Glu Ile Asp  Phe Asn Asn
    1145                1150                1155

Asn Ser  Ile Val Leu Gly Lys  Cys Glu Ile Trp Arg  Met Glu Gly
    1160                1165                1170

Gly Ser  Gly His Thr Val Thr  Asp Asp Ile Asp His  Phe Phe Ser
    1175                1180                1185

Ala Pro  Ser Ile Thr Tyr Arg  Glu Pro His Leu Ser  Ile Tyr Asp
    1190                1195                1200

Val Leu  Glu Val Gln Lys Glu  Glu Leu Asp Leu Ser  Lys Asp Leu
    1205                1210                1215

Met Val  Leu Pro Asn Ala Pro  Asn Arg Val Phe Ala  Trp Glu Thr
    1220                1225                1230

Gly Trp  Thr Pro Gly Leu Arg  Ser Leu Glu Asn Asp  Gly Thr Lys
    1235                1240                1245

Leu Leu  Asp Arg Ile Arg Asp  Asn Tyr Glu Gly Glu  Phe Tyr Trp
    1250                1255                1260

Arg Tyr  Phe Ala Phe Ile Ala  Asp Ala Leu Ile Thr  Thr Leu Lys
    1265                1270                1275

Pro Arg  Tyr Glu Asp Thr Asn  Ile Arg Ile Asn Leu  Asp Ser Asn
    1280                1285                1290

Thr Arg  Ser Phe Ile Val Pro  Ile Ile Thr Thr Glu  Tyr Ile Arg
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1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile Leu
1370 1375 1380

Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro

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1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys Thr
1535 1540 1545

Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Arg Lys Gly Ser Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe
1580 1585 1590

Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr

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1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu

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1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Val
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr

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2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr

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2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 747
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 747

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

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Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270
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Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480
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```
Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Phe Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ser Arg Ala Lys Ala
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545                 550                 555                 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
            580                 585                 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
        595                 600                 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
    610                 615                 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625                 630                 635                 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
                645                 650                 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
            660                 665                 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
        675                 680                 685
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```
Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
    690                 695                 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705                 710                 715                 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
                725                 730                 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
            740                 745                 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
        755                 760                 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
    770                 775                 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785                 790                 795                 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
                805                 810                 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
            820                 825                 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
        835                 840                 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
    850                 855                 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865                 870                 875                 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
                885                 890                 895
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```
Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
        915                 920                 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Ile  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050

Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
    1055                1060                1065

Asn Leu  Thr Thr Ala Thr Thr  Ala Ile Ile Thr Ser  Ser Leu Gly
    1070                1075                1080

Val Ala  Ser Gly Phe Ser Ile  Leu Leu Val Pro Leu  Ala Gly Ile
    1085                1090                1095
```

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```
Ser Ala  Gly Ile Pro Ser Leu  Val Asn Asn Glu Leu  Val Leu Arg
    1100                1105                1110

Asp Lys  Ala Thr Lys Val Val  Asp Tyr Phe Lys His  Val Ser Leu
    1115                1120                1125

Val Glu  Thr Glu Gly Val Phe  Thr Leu Leu Asp Asp  Lys Ile Met
    1130                1135                1140

Met Pro  Gln Asp Asp Leu Val  Ile Ser Glu Ile Asp  Phe Asn Asn
    1145                1150                1155

Asn Ser  Ile Val Leu Gly Lys  Cys Glu Ile Trp Arg  Met Glu Gly
    1160                1165                1170

Gly Ser  Gly His Thr Val Thr  Asp Asp Ile Asp His  Phe Phe Ser
    1175                1180                1185

Ala Pro  Ser Ile Thr Tyr Arg  Glu Pro His Leu Ser  Ile Tyr Asp
    1190                1195                1200

Val Leu  Glu Val Gln Lys Glu  Glu Leu Asp Leu Ser  Lys Asp Leu
    1205                1210                1215

Met Val  Leu Pro Asn Ala Pro  Asn Arg Val Phe Ala  Trp Glu Thr
    1220                1225                1230

Gly Trp  Thr Pro Gly Leu Arg  Ser Leu Glu Asn Asp  Gly Thr Lys
    1235                1240                1245

Leu Leu  Asp Arg Ile Arg Asp  Asn Tyr Glu Gly Glu  Phe Tyr Trp
    1250                1255                1260

Arg Tyr  Phe Ala Phe Ile Ala  Asp Ala Leu Ile Thr  Thr Leu Lys
    1265                1270                1275

Pro Arg  Tyr Glu Asp Thr Asn  Ile Arg Ile Asn Leu  Asp Ser Asn
    1280                1285                1290
```

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```
Thr Arg  Ser Phe Ile Val Pro  Ile Ile Thr Thr Glu  Tyr Ile Arg
    1295                1300                1305

Glu Lys  Leu Ser Tyr Ser Phe  Tyr Gly Ser Gly Gly  Thr Tyr Ala
    1310                1315                1320

Leu Ser  Leu Ser Gln Tyr Asn  Met Gly Ile Asn Ile  Glu Leu Ser
    1325                1330                1335

Glu Ser  Asp Val Trp Ile Ile  Asp Val Asp Asn Val  Val Arg Asp
    1340                1345                1350

Val Thr  Ile Glu Ser Asp Lys  Ile Lys Lys Gly Asp  Leu Ile Glu
    1355                1360                1365

Gly Ile  Leu Ser Thr Leu Ser  Ile Glu Glu Asn Lys  Ile Ile Leu
    1370                1375                1380

Asn Ser  His Glu Ile Asn Phe  Ser Gly Glu Val Asn  Gly Ser Asn
    1385                1390                1395

Gly Phe  Val Ser Leu Thr Phe  Ser Ile Leu Glu Gly  Ile Asn Ala
    1400                1405                1410

Ile Ile  Glu Val Asp Leu Leu  Ser Lys Ser Tyr Lys  Leu Leu Ile
    1415                1420                1425

Ser Gly  Glu Leu Lys Ile Leu  Met Leu Asn Ser Asn  His Ile Gln
    1430                1435                1440

Gln Lys  Ile Asp Tyr Ile Gly  Phe Asn Ser Glu Leu  Gln Lys Asn
    1445                1450                1455

Ile Pro  Tyr Ser Phe Val Asp  Ser Glu Gly Lys Glu  Asn Gly Phe
    1460                1465                1470

Ile Asn  Gly Ser Thr Lys Glu  Gly Leu Phe Val Ser  Glu Leu Pro
    1475                1480                1485
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Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys Thr
1535 1540 1545

Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Arg Lys Gly Ser Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe
1580 1585 1590

Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

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Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

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Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Val
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr
2060 2065 2070

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Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

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Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 748
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 748

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys

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50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
130 135 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145 150 155 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
165 170 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
180 185 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
195 200 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
210 215 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225 230 235 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg

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260 265 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Ala Val Ala Met
275 280 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
290 295 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu

```
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545                 550                 555                 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
            580                 585                 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
        595                 600                 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
    610                 615                 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625                 630                 635                 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
                645                 650                 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
            660                 665                 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
```

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675 680 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
690 695 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705 710 715 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
725 730 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
740 745 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
755 760 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
770 775 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785 790 795 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
805 810 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
820 825 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
835 840 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
850 855 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865 870 875 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser

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                885                 890                 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
        915                 920                 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Ile  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050

Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
    1055                1060                1065

Asn Leu  Thr Thr Ala Thr Thr  Ala Ile Ile Thr Ser  Ser Leu Gly
    1070                1075                1080

Ile Ala  Ser Gly Phe Ser Ile  Leu Leu Val Pro Leu  Ala Gly Ile
```

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1085 1090 1095

Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg
1100 1105 1110

Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Val Ser Leu
1115 1120 1125

Val Glu Thr Glu Gly Val Phe Thr Leu Leu Asp Asp Lys Ile Met
1130 1135 1140

Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn

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1280 1285 1290

Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile Leu
1370 1375 1380

Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro

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1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys Thr
1535 1540 1545

Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Arg Lys Gly Asn Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe
1580 1585 1590

Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile

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1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr

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1865 1870 1875

Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Val
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr

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2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly

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2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 749
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 749

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

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Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
130 135 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145 150 155 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
165 170 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
180 185 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
195 200 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
210 215 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225 230 235 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
245 250 255

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Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460
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```
Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545                 550                 555                 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
            580                 585                 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
        595                 600                 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
    610                 615                 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625                 630                 635                 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
                645                 650                 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
            660                 665                 670
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```
Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
        675                 680                 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
    690                 695                 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705                 710                 715                 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
                725                 730                 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
            740                 745                 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
        755                 760                 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
    770                 775                 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785                 790                 795                 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
                805                 810                 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
            820                 825                 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
        835                 840                 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
    850                 855                 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865                 870                 875                 880
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```
His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Glu Glu Gly Phe Ser
                885                 890                 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
        915                 920                 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Ile  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050

Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
    1055                1060                1065

Asn Leu  Thr Thr Ala Thr Thr  Ala Ile Ile Thr Ser  Ser Leu Gly
    1070                1075                1080
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```
Ile Ala  Ser Gly Phe Ser Ile  Leu Leu Val Pro Leu  Ala Gly Ile
    1085                1090                1095

Ser Ala  Gly Ile Pro Ser Leu  Val Asn Asn Glu Leu  Val Leu Arg
    1100                1105                1110

Asp Lys  Ala Thr Lys Val Val  Asp Tyr Phe Lys His  Val Ser Leu
    1115                1120                1125

Val Glu  Thr Glu Gly Val Phe  Thr Leu Leu Asp Asp  Lys Ile Met
    1130                1135                1140

Met Pro  Gln Asp Asp Leu Val  Ile Ser Glu Ile Asp  Phe Asn Asn
    1145                1150                1155

Asn Ser  Ile Val Leu Gly Lys  Cys Glu Ile Trp Arg  Met Glu Gly
    1160                1165                1170

Gly Ser  Gly His Thr Val Thr  Asp Asp Ile Asp His  Phe Phe Ser
    1175                1180                1185

Ala Pro  Ser Ile Thr Tyr Arg  Glu Pro His Leu Ser  Ile Tyr Asp
    1190                1195                1200

Val Leu  Glu Val Gln Lys Glu  Glu Leu Asp Leu Ser  Lys Asp Leu
    1205                1210                1215

Met Val  Leu Pro Asn Ala Pro  Asn Arg Val Phe Ala  Trp Glu Thr
    1220                1225                1230

Gly Trp  Thr Pro Gly Leu Arg  Ser Leu Glu Asn Asp  Gly Thr Lys
    1235                1240                1245

Leu Leu  Asp Arg Ile Arg Asp  Asn Tyr Glu Gly Glu  Phe Tyr Trp
    1250                1255                1260

Arg Tyr  Phe Ala Phe Ile Ala  Asp Ala Leu Ile Thr  Thr Leu Lys
    1265                1270                1275
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Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile Leu
1370 1375 1380

Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

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```
Ile Asn  Gly Ser Thr Lys Glu  Gly Leu Phe Val Ser  Glu Leu Pro
    1475                1480                1485

Asp Val  Val Leu Ile Ser Lys  Val Tyr Met Asp Asp  Ser Lys Pro
    1490                1495                1500

Ser Phe  Gly Tyr Tyr Ser Asn  Asn Leu Lys Asp Val  Lys Val Ile
    1505                1510                1515

Thr Lys  Asp Asn Val Asn Ile  Leu Thr Gly Tyr Tyr  Leu Lys Asp
    1520                1525                1530

Asp Ile  Lys Ile Ser Leu Ser  Leu Thr Leu Gln Asp  Glu Lys Thr
    1535                1540                1545

Ile Lys  Leu Asn Ser Val His  Leu Asp Glu Ser Gly  Val Ala Glu
    1550                1555                1560

Ile Leu  Lys Phe Met Asn Arg  Lys Gly Asn Thr Asn  Thr Ser Asp
    1565                1570                1575

Ser Leu  Met Ser Phe Leu Glu  Ser Met Asn Ile Lys  Ser Ile Phe
    1580                1585                1590

Val Asn  Phe Leu Gln Ser Asn  Ile Lys Phe Ile Leu  Asp Ala Asn
    1595                1600                1605

Phe Ile  Ile Ser Gly Thr Thr  Ser Ile Gly Gln Phe  Glu Phe Ile
    1610                1615                1620

Cys Asp  Glu Asn Asp Asn Ile  Gln Pro Tyr Phe Ile  Lys Phe Asn
    1625                1630                1635

Thr Leu  Glu Thr Asn Tyr Thr  Leu Tyr Val Gly Asn  Arg Gln Asn
    1640                1645                1650

Met Ile  Val Glu Pro Asn Tyr  Asp Leu Asp Asp Ser  Gly Asp Ile
    1655                1660                1665
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Ser Ser  Thr Val Ile Asn Phe  Ser Gln Lys Tyr Leu  Tyr Gly Ile
    1670                1675                1680

Asp Ser  Cys Val Asn Lys Val  Val Ile Ser Pro Asn  Ile Tyr Thr
    1685                1690                1695

Asp Glu  Ile Asn Ile Thr Pro  Val Tyr Glu Thr Asn  Asn Thr Tyr
    1700                1705                1710

Pro Glu  Val Ile Val Leu Asp  Ala Asn Tyr Ile Asn  Glu Lys Ile
    1715                1720                1725

Asn Val  Asn Ile Asn Asp Leu  Ser Ile Arg Tyr Val  Trp Ser Asn
    1730                1735                1740

Asp Gly  Asn Asp Phe Ile Leu  Met Ser Thr Ser Glu  Glu Asn Lys
    1745                1750                1755

Val Ser  Gln Val Lys Ile Arg  Phe Val Asn Val Phe  Lys Asp Lys
    1760                1765                1770

Thr Leu  Ala Asn Lys Leu Ser  Phe Asn Phe Ser Asp  Lys Gln Asp
    1775                1780                1785

Val Pro  Val Ser Glu Ile Ile  Leu Ser Phe Thr Pro  Ser Tyr Tyr
    1790                1795                1800

Glu Asp  Gly Leu Ile Gly Tyr  Asp Leu Gly Leu Val  Ser Leu Tyr
    1805                1810                1815

Asn Glu  Lys Phe Tyr Ile Asn  Asn Phe Gly Met Met  Val Ser Gly
    1820                1825                1830

Leu Ile  Tyr Ile Asn Asp Ser  Leu Tyr Tyr Phe Lys  Pro Pro Val
    1835                1840                1845

Asn Asn  Leu Ile Thr Gly Phe  Val Thr Val Gly Asp  Asp Lys Tyr
    1850                1855                1860
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Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Glu
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Val
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp Gly
2000 2005 2010

Lys Tyr Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile
2045 2050 2055

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Leu Asn  Phe Asn Asn Lys Ile  Tyr Tyr Phe Asp Asp  Ser Phe Thr
    2060                 2065                 2070

Ala Val  Val Gly Trp Lys Asp  Leu Glu Asp Gly Ser  Lys Tyr Tyr
    2075                 2080                 2085

Phe Asp  Glu Asp Thr Ala Glu  Ala Tyr Ile Gly Leu  Ser Leu Ile
    2090                 2095                 2100

Asn Asp  Gly Gln Tyr Tyr Phe  Asn Asp Asp Gly Ile  Met Gln Val
    2105                 2110                 2115

Gly Phe  Val Thr Ile Asn Asp  Lys Val Phe Tyr Phe  Ser Asp Ser
    2120                 2125                 2130

Gly Ile  Ile Glu Ser Gly Val  Gln Asn Ile Asp Asp  Asn Tyr Phe
    2135                 2140                 2145

Tyr Ile  Asp Asp Asn Gly Ile  Val Gln Ile Gly Val  Phe Asp Thr
    2150                 2155                 2160

Ser Asp  Gly Tyr Lys Tyr Phe  Ala Pro Ala Asn Thr  Val Asn Asp
    2165                 2170                 2175

Asn Ile  Tyr Gly Gln Ala Val  Glu Tyr Ser Gly Leu  Val Arg Val
    2180                 2185                 2190

Gly Glu  Asp Val Tyr Tyr Phe  Gly Glu Thr Tyr Thr  Ile Glu Thr
    2195                 2200                 2205

Gly Trp  Ile Tyr Asp Met Glu  Asn Glu Ser Asp Lys  Tyr Tyr Phe
    2210                 2215                 2220

Asn Pro  Glu Thr Lys Lys Ala  Cys Lys Gly Ile Asn  Leu Ile Asp
    2225                 2230                 2235

Asp Ile  Lys Tyr Tyr Phe Asp  Glu Lys Gly Ile Met  Arg Thr Gly
    2240                 2245                 2250
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Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 750
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 750

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu

```
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
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245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
260 265 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Ala Val Ala Met
275 280 285

Leu Pro Gly Ile Gln Pro Gly Leu Phe Glu Ser Ile Glu Lys Pro Ser
290 295 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr

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    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545                 550                 555                 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
            580                 585                 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
        595                 600                 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
    610                 615                 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625                 630                 635                 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
                645                 650                 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
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660 665 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
675 680 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
690 695 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Lys Val Lys Asp
705 710 715 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
725 730 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
740 745 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
755 760 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
770 775 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785 790 795 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
805 810 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
820 825 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
835 840 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
850 855 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser

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865 870 875 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
885 890 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
900 905 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
915 920 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
930 935 940

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945 950 955 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
965 970 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
980 985 990

Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp Ala Ala Lys Val Val Glu
995 1000 1005

Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu Pro Thr
1010 1015 1020

Leu Ser Glu Gly Leu Pro Ile Ile Ala Thr Ile Ile Asp Gly Val
1025 1030 1035

Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp Pro
1040 1045 1050

Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala Val
1055 1060 1065

Asn Leu Thr Thr Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu Gly

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1070 1075 1080

Val Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile
1085 1090 1095

Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg
1100 1105 1110

Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Val Ser Leu
1115 1120 1125

Val Glu Thr Glu Gly Val Phe Thr Leu Leu Asp Asp Lys Ile Met
1130 1135 1140

Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys

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1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile Leu
1370 1375 1380

Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe

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1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys Thr
1535 1540 1545

Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Arg Lys Gly Asn Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe
1580 1585 1590

Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile

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1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr

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1850 1855 1860

Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Tyr Lys Tyr Tyr Phe Asn Ser Asp Gly Val
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile

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2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly

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2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 751
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 751

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

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```
Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240
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Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Gly Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445
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Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Glu Met Ala Ser Leu Trp Thr Phe Asp Asp Ala Arg Ala Lys Val
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545                 550                 555                 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
            580                 585                 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Ile Leu Phe Gln
        595                 600                 605

Lys Asn Ile Glu Asn Ser Glu Val Ala Tyr Tyr Tyr Asn Pro Gly Asp
    610                 615                 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Arg Ile Pro Ser Ile Ile Ser
625                 630                 635                 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
                645                 650                 655
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Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser Thr
            660                 665                 670

Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Ser Lys
        675                 680                 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
    690                 695                 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705                 710                 715                 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
                725                 730                 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Asn Glu Gly Arg Arg Glu
            740                 745                 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
        755                 760                 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
    770                 775                 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785                 790                 795                 800

Gln Glu Ile Arg Asn Asn Ser Asn Leu Ser Asp Ile Glu Leu Glu Glu
                805                 810                 815

Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
            820                 825                 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
        835                 840                 845

Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser Ile
    850                 855                 860
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Ser Asp Ser Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Asp Asp Ser
865                 870                 875                 880

His Phe Ile Ser Phe Glu Asp Ile Ser Lys Thr Glu Asp Gly Phe Ser
                885                 890                 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Glu Ile Phe Ser Glu Tyr Ala Asn His Ile Arg Gly Glu Ile
        915                 920                 925

Ser Asn Ile Lys Asp Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Ala Ile His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Gly Tyr Ser Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Val  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050

Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
    1055                1060                1065
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Asn Leu  Thr Ala Ala Thr Thr  Ala Ile Ile Thr Ser  Ser Leu Gly
    1070                1075                1080

Val Ala  Ser Gly Phe Ser Ile  Leu Leu Val Pro Leu  Ala Gly Ile
    1085                1090                1095

Ser Ala  Gly Ile Pro Ser Leu  Val Asn Asn Glu Leu  Val Leu Arg
    1100                1105                1110

Asp Lys  Ala Thr Lys Val Val  Asp Tyr Phe Lys His  Ile Ser Leu
    1115                1120                1125

Val Glu  Thr Glu Gly Ala Phe  Thr Leu Leu Asp Asp  Lys Ile Met
    1130                1135                1140

Ile Pro  Gln Asp Asp Leu Val  Ile Ser Glu Ile Asp  Phe Asn Asn
    1145                1150                1155

Asn Ser  Ile Val Leu Gly Lys  Cys Glu Ile Trp Arg  Met Glu Gly
    1160                1165                1170

Gly Ser  Gly His Thr Val Thr  Asn Asp Ile Asp His  Phe Phe Ser
    1175                1180                1185

Ser Pro  Thr Ile Thr Tyr Ile  Lys Pro His Leu Ser  Ile Tyr Asp
    1190                1195                1200

Val Leu  Glu Val Gln Lys Glu  Glu Leu Asp Leu Ser  Lys Asp Leu
    1205                1210                1215

Met Val  Leu Pro Asn Ala Pro  Asn Arg Val Phe Ala  Trp Glu Thr
    1220                1225                1230

Gly Trp  Thr Pro Gly Leu Arg  Ser Leu Glu Asn Glu  Gly Thr Lys
    1235                1240                1245

Leu Leu  Asp Arg Ile Arg Asp  His Tyr Lys Gly Glu  Phe Tyr Trp
    1250                1255                1260
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Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Asn Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu His Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe His Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Asp Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Asp Asn Lys Ile Ile Leu
1370 1375 1380

Asn His His Glu Ile Asn Phe Ser Gly Asp Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Ile Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

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Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Phe Thr Leu Gln Asp Glu Lys Thr
1535 1540 1545

Ile Lys Leu Asn Gly Val His Leu Asp Glu Ser Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Lys Lys Gly Ser Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Val Asn Ile Lys Ser Ile Phe
1580 1585 1590

Val Asn Phe Leu Gln Ser Lys Ile Asn Phe Ile Leu Asp Ala Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Thr Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

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```
Met Ile  Val Glu Pro Asn Tyr  Asp Leu Asp Asp Ser  Gly Asp Ile
    1655                1660                1665

Ser Ser  Thr Val Ile Asn Phe  Ser Gln Lys Tyr Leu  Tyr Gly Ile
    1670                1675                1680

Asp Ser  Cys Val Asn Lys Val  Val Ile Ser Pro Asn  Ile Tyr Thr
    1685                1690                1695

Asp Glu  Ile Asn Ile Thr Pro  Val Tyr Glu Thr Asn  Asn Asn Tyr
    1700                1705                1710

Pro Glu  Val Ile Val Leu Asp  Ala Asn Tyr Ile Asn  Glu Lys Ile
    1715                1720                1725

Asn Val  Asn Ile Asn Asp Leu  Ser Ile Arg Tyr Val  Trp Ser Asn
    1730                1735                1740

Asp Gly  Asn Asp Phe Ile Leu  Met Ser Thr Ser Glu  Glu Asn Lys
    1745                1750                1755

Val Ser  Gln Val Lys Ile Arg  Phe Val Asn Val Phe  Lys Asp Lys
    1760                1765                1770

Thr Leu  Ala Asn Lys Leu Ser  Phe Asn Phe Ser Asp  Lys Gln Asp
    1775                1780                1785

Val Pro  Val Ser Glu Ile Ile  Ser Ala Phe Thr Pro  Ser Tyr Tyr
    1790                1795                1800

Glu Asp  Gly Leu Ile Gly Tyr  Asp Leu Gly Leu Val  Ser Leu Tyr
    1805                1810                1815

Asn Glu  Lys Phe Tyr Ile Asn  Asn Phe Gly Met Met  Val Ser Gly
    1820                1825                1830

Leu Ile  Tyr Ile Asn Asp Ser  Leu Tyr Tyr Phe Lys  Pro Pro Val
    1835                1840                1845
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Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Thr Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asn Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Ile Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Leu Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Glu
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met Tyr Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Ile
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Lys Lys Tyr Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Ile Glu Ile Asp Gly
2000 2005 2010

Lys Tyr Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Ser Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

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```
Asp Leu  Gly Asn Glu Glu Gly  Glu Ala Ile Ser Tyr  Ser Gly Ile
    2045                2050                2055

Leu Asn  Phe Asn Asn Lys Ile  Tyr Tyr Phe Asp Tyr  Ser Phe Thr
    2060                2065                2070

Ala Val  Val Gly Trp Lys Asp  Leu Glu Asp Gly Ser  Lys Tyr Tyr
    2075                2080                2085

Phe Asp  Glu Asp Thr Ala Glu  Ala Tyr Val Gly Leu  Ser Leu Ile
    2090                2095                2100

Asn Asp  Gly Gln Tyr Tyr Phe  Asn Asp Asp Gly Ile  Met Gln Val
    2105                2110                2115

Gly Phe  Val Thr Ile Asn Asn  Lys Val Phe Tyr Phe  Ser Asp Ser
    2120                2125                2130

Gly Ile  Ile Glu Ser Gly Val  Gln Asn Ile Asp Asp  Asn Tyr Phe
    2135                2140                2145

Tyr Ile  Asp Glu Lys Gly Ile  Val Gln Ile Gly Val  Phe Asp Thr
    2150                2155                2160

Ser Asp  Glu Tyr Lys Tyr Phe  Ala Pro Ala Asn Thr  Val Asn Asp
    2165                2170                2175

Asn Ile  Tyr Gly Gln Ala Val  Asp Tyr Ser Gly Leu  Val Arg Val
    2180                2185                2190

Gly Glu  Asp Ile Tyr Tyr Phe  Gly Glu Thr Tyr Thr  Ile Glu Thr
    2195                2200                2205

Gly Trp  Ile Tyr Asp Met Glu  Asn Glu Ser Asp Lys  Tyr Tyr Phe
    2210                2215                2220

Asn Pro  Glu Thr Lys Lys Ala  Cys Lys Gly Ile Asn  Leu Ile Asp
    2225                2230                2235
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Asp Ile Lys Tyr Tyr Phe Asp Glu Asn Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asp Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Gln
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 752
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 752

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu

```
            20                  25                  30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val Arg
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225 230 235 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu Gln
245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
260 265 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Ala Val Ala Met
275 280 285

Leu Pro Gly Ile Gln Pro Gly Leu Phe Glu Ser Ile Glu Lys Pro Ser
290 295 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu

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435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Thr Phe Asp Asp Ala Arg Ala Lys Val
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
530 535 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545 550 555 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
565 570 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
580 585 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Ile Leu Phe Gln
595 600 605

Lys Asn Ile Glu Asn Ser Glu Val Ala Tyr Tyr Tyr Asn Pro Gly Asp
610 615 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Arg Ile Pro Ser Ile Ile Ser
625 630 635 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu

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645 650 655

Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser Thr
660 665 670

Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Ser Lys
675 680 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
690 695 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705 710 715 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
725 730 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Asn Glu Gly Arg Arg Glu
740 745 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
755 760 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
770 775 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785 790 795 800

Gln Glu Ile Arg Asn Asn Ser Asn Leu Ser Asp Ile Glu Leu Glu Glu
805 810 815

Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
820 825 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
835 840 845

Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser Ile

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    850                 855                 860

Ser Asp Ser Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Asp Asp Ser
865                 870                 875                 880

His Phe Ile Ser Phe Glu Asp Ile Ser Lys Thr Glu Asp Gly Phe Ser
                885                 890                 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Glu Ile Phe Ser Glu Tyr Ala Asn His Ile Arg Gly Glu Ile
        915                 920                 925

Ser Asn Ile Lys Asp Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Ala Ile His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Gly Tyr Ser Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Val  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050

Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
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1055 1060 1065

Asn Leu Thr Ala Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu Gly
1070 1075 1080

Val Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile
1085 1090 1095

Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg
1100 1105 1110

Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Ile Ser Leu
1115 1120 1125

Val Glu Thr Glu Gly Ala Phe Thr Leu Leu Asp Asp Lys Ile Met
1130 1135 1140

Ile Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asn Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ser Pro Thr Ile Thr Tyr Ile Lys Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Glu Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp His Tyr Lys Gly Glu Phe Tyr Trp

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1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Asn Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu His Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe His Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Asp Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Asp Asn Lys Ile Ile Leu
1370 1375 1380

Asn His His Glu Ile Asn Phe Ser Gly Asp Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Ile Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn

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1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Phe Thr Leu Gln Asp Glu Lys Thr
1535 1540 1545

Ile Lys Leu Asn Gly Val His Leu Asp Glu Ser Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Lys Lys Gly Ser Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Val Asn Ile Lys Ser Ile Phe
1580 1585 1590

Val Asn Phe Leu Gln Ser Lys Ile Asn Phe Ile Leu Asp Ala Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Thr Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn

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1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Asn Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Ser Ala Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val

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1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Thr Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asn Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Ile Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Leu Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Glu
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met Tyr Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Ile
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Lys Lys Tyr Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Ile Glu Ile Asp Gly
2000 2005 2010

Lys Tyr Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Ser Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu

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2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Ala Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Tyr Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Val Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asn Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Glu Lys Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Glu Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Asp Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Ile Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp

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2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Asn Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asp Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Gln
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

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<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 753

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

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Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
            20                  25                  30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220
```

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```
Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430
```

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```
Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Glu Met Ala Ser Leu Trp Thr Phe Asp Asp Ala Arg Ala Lys Val
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545                 550                 555                 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
            580                 585                 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Ile Leu Phe Gln
        595                 600                 605

Lys Asn Ile Glu Asn Ser Glu Val Ala Tyr Tyr Tyr Asn Pro Gly Asp
    610                 615                 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Arg Ile Pro Ser Ile Ile Ser
625                 630                 635                 640
```

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Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
645 650 655

Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser Thr
660 665 670

Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Ser Lys
675 680 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
690 695 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705 710 715 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
725 730 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Asn Glu Gly Arg Arg Glu
740 745 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
755 760 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
770 775 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785 790 795 800

Gln Glu Ile Arg Asn Asn Ser Asn Leu Ser Asp Ile Glu Leu Glu Glu
805 810 815

Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
820 825 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
835 840 845

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```
Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser Ile
    850                 855                 860

Ser Asp Ser Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Asp Asp Ser
865                 870                 875                 880

His Phe Ile Ser Phe Glu Asp Ile Ser Lys Thr Glu Asp Gly Phe Ser
                885                 890                 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Glu Ile Phe Ser Glu Tyr Ala Asn His Ile Arg Arg Glu Ile
        915                 920                 925

Ser Asn Ile Lys Asp Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Ala Ile His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Gly Tyr Ser Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Val  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050
```

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Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala Val
1055 1060 1065

Asn Leu Thr Ala Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu Gly
1070 1075 1080

Ile Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile
1085 1090 1095

Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg
1100 1105 1110

Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Ile Ser Leu
1115 1120 1125

Val Glu Thr Glu Gly Ala Phe Thr Leu Leu Asp Asp Lys Ile Met
1130 1135 1140

Ile Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asn Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ser Pro Thr Ile Thr Tyr Ile Lys Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Glu Gly Thr Lys
1235 1240 1245

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```
Leu Leu  Asp Arg Ile Arg Asp  His Tyr Lys Gly Glu  Phe Tyr Trp
    1250                1255                1260

Arg Tyr  Phe Ala Phe Ile Ala  Asp Ala Leu Ile Thr  Thr Leu Lys
    1265                1270                1275

Pro Arg  Tyr Glu Asp Thr Asn  Ile Arg Ile Asn Leu  Asp Ser Asn
    1280                1285                1290

Asn Arg  Ser Phe Ile Val Pro  Ile Ile Thr Thr Glu  His Ile Arg
    1295                1300                1305

Glu Lys  Leu Ser Tyr Ser Phe  His Gly Ser Gly Gly  Thr Tyr Ala
    1310                1315                1320

Leu Ser  Leu Ser Gln Tyr Asn  Met Gly Ile Asn Ile  Glu Leu Ser
    1325                1330                1335

Glu Ser  Asp Val Trp Ile Ile  Asp Val Asp Asn Val  Val Arg Asp
    1340                1345                1350

Val Thr  Ile Asp Ser Asp Lys  Ile Lys Lys Gly Asp  Leu Ile Glu
    1355                1360                1365

Gly Ile  Leu Ser Thr Leu Ser  Ile Glu Asp Asn Lys  Ile Ile Leu
    1370                1375                1380

Asn His  His Glu Ile Asn Phe  Ser Gly Asp Val Asn  Gly Ser Asn
    1385                1390                1395

Gly Phe  Ile Ser Leu Thr Phe  Ser Ile Leu Glu Gly  Ile Asn Ala
    1400                1405                1410

Ile Ile  Glu Val Asp Leu Leu  Ser Lys Ser Tyr Lys  Leu Leu Ile
    1415                1420                1425

Ser Gly  Glu Leu Lys Ile Leu  Met Leu Asn Ser Asn  His Ile Gln
    1430                1435                1440
```

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Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Phe Thr Leu Gln Asp Glu Lys Thr
1535 1540 1545

Ile Lys Leu Asn Gly Val His Leu Asp Glu Ser Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Lys Lys Gly Ser Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Val Asn Ile Lys Ser Ile Phe
1580 1585 1590

Val Asn Phe Leu Gln Ser Lys Ile Asn Phe Ile Leu Asp Ala Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

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```
Thr Leu  Glu Thr Thr Tyr Thr  Leu Tyr Val Gly Asn  Arg Gln Asn
    1640                1645                1650

Met Ile  Val Glu Pro Asn Tyr  Asp Leu Asp Asp Ser  Gly Asp Ile
    1655                1660                1665

Ser Ser  Thr Val Ile Asn Phe  Ser Gln Lys Tyr Leu  Tyr Gly Ile
    1670                1675                1680

Asp Ser  Cys Val Asn Lys Val  Val Ile Ser Pro Asn  Ile Tyr Thr
    1685                1690                1695

Asp Glu  Ile Asn Ile Thr Pro  Val Tyr Glu Thr Asn  Asn Asn Tyr
    1700                1705                1710

Pro Glu  Val Ile Val Leu Asp  Ala Asn Tyr Ile Asn  Glu Lys Ile
    1715                1720                1725

Asn Val  Asn Ile Asn Asp Leu  Ser Ile Arg Tyr Val  Trp Ser Asn
    1730                1735                1740

Asp Gly  Asn Asp Phe Ile Leu  Met Ser Thr Ser Glu  Glu Asn Lys
    1745                1750                1755

Val Ser  Gln Val Lys Ile Arg  Phe Val Asn Val Phe  Lys Asp Lys
    1760                1765                1770

Thr Leu  Ala Asn Lys Leu Ser  Phe Asn Phe Ser Asp  Lys Gln Asp
    1775                1780                1785

Val Pro  Val Ser Glu Ile Ile  Ser Ala Phe Thr Pro  Ser Tyr Tyr
    1790                1795                1800

Glu Asp  Gly Leu Ile Gly Tyr  Asp Leu Gly Leu Val  Ser Leu Tyr
    1805                1810                1815

Asn Glu  Lys Phe Tyr Ile Asn  Asn Phe Gly Met Met  Val Ser Gly
    1820                1825                1830
```

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Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Thr Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asn Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Ile Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Leu Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Glu
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met Tyr Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Ile
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Lys Lys Tyr Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Ile Glu Ile Asp Gly
2000 2005 2010

Lys Tyr Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

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Phe Asn Thr Ser Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Ala Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Tyr Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Val Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asn Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Glu Lys Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Glu Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Asp Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Ile Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

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Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Asn Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asp Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Gln
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 754
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 754

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe

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1               5                   10                  15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
            20                  25                  30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
```

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210 215 220

Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val Arg
225 230 235 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu Gln
245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
260 265 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Ala Val Ala Met
275 280 285

Leu Pro Gly Ile Gln Pro Gly Leu Phe Glu Ser Ile Glu Lys Pro Ser
290 295 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp

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420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Thr Phe Asp Asp Ala Arg Ala Lys Val
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
530 535 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545 550 555 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
565 570 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
580 585 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Ile Leu Phe Gln
595 600 605

Lys Asn Ile Glu Asn Ser Glu Val Ala Tyr Tyr Tyr Asn Pro Gly Asp
610 615 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Arg Ile Pro Ser Ile Ile Ser

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625 630 635 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
645 650 655

Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser Thr
660 665 670

Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Ser Lys
675 680 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
690 695 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705 710 715 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
725 730 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Asn Glu Gly Arg Arg Glu
740 745 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
755 760 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
770 775 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785 790 795 800

Gln Glu Ile Arg Asn Asn Ser Asn Leu Ser Asp Ile Glu Leu Glu Glu
805 810 815

Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
820 825 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser

835 840 845

Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser Ile
850 855 860

Ser Asp Ser Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Asp Asp Ser
865 870 875 880

His Phe Ile Ser Phe Glu Asp Ile Ser Lys Thr Glu Asp Gly Phe Ser
885 890 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
900 905 910

Glu Lys Glu Ile Phe Ser Glu Tyr Ala Asn His Ile Arg Gly Glu Ile
915 920 925

Ser Asn Ile Lys Asp Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
930 935 940

Lys Lys Val Asn Leu Asp Ala Ile His Glu Val Asn Thr Leu Asn Ala
945 950 955 960

Ala Phe Phe Ile Gln Ser Leu Ile Gly Tyr Ser Ser Ser Lys Glu Ser
965 970 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
980 985 990

Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp Ala Ala Lys Val Val Glu
995 1000 1005

Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu Pro Thr
1010 1015 1020

Leu Ser Glu Gly Leu Pro Val Ile Ala Thr Ile Ile Asp Gly Val
1025 1030 1035

Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp Pro

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1040 1045 1050

Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala Val
1055 1060 1065

Asn Leu Thr Ala Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu Gly
1070 1075 1080

Val Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile
1085 1090 1095

Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg
1100 1105 1110

Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Ile Ser Leu
1115 1120 1125

Val Glu Thr Glu Gly Ala Phe Thr Leu Leu Asp Asp Lys Ile Met
1130 1135 1140

Ile Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asn Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ser Pro Thr Ile Thr Tyr Ile Lys Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Glu Gly Thr Lys

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1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp His Tyr Lys Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Asn Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu His Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe His Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Asp Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Asp Asn Lys Ile Ile Leu
1370 1375 1380

Asn His His Glu Ile Asn Phe Ser Gly Asp Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Ile Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln

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1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Phe Thr Leu Gln Asp Glu Lys Thr
1535 1540 1545

Ile Lys Leu Asn Gly Val His Leu Asp Glu Ser Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Lys Lys Gly Ser Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Val Asn Ile Lys Ser Ile Phe
1580 1585 1590

Val Asn Phe Leu Gln Ser Lys Ile Asn Phe Ile Leu Asp Ala Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn

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1625 1630 1635

Thr Leu Glu Thr Thr Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Asn Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Ser Ala Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly

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1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Thr Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asn Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Ile Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Leu Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Glu
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met Tyr Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Ile
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Lys Lys Tyr Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Ile Glu Ile Asp Gly
2000 2005 2010

Lys Tyr Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val

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2015 2020 2025

Phe Asn Thr Ser Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Ala Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Tyr Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Val Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asn Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Glu Lys Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Glu Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Asp Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Ile Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe

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2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Asn Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asp Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Gln
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

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<213> Artificial Sequence

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<223> Synthetic amino acid sequence

<400> 755

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Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
            20                  25                  30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
        195                 200                 205
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```
Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415
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```
Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Glu Met Ala Ser Leu Trp Thr Phe Asp Asp Ala Arg Ala Lys Val
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545                 550                 555                 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
            580                 585                 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Ile Leu Phe Gln
        595                 600                 605

Lys Asn Ile Glu Asn Ser Glu Val Ala Tyr Tyr Tyr Asn Pro Gly Asp
    610                 615                 620
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```
Gly Glu Ile Gln Glu Ile Asp Lys Tyr Arg Ile Pro Ser Ile Ile Ser
625                 630                 635                 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
                645                 650                 655

Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser Thr
            660                 665                 670

Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Ser Lys
        675                 680                 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
    690                 695                 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705                 710                 715                 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
                725                 730                 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Asn Glu Gly Arg Arg Glu
            740                 745                 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
        755                 760                 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
    770                 775                 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785                 790                 795                 800

Gln Glu Ile Arg Asn Asn Ser Asn Leu Ser Asp Ile Glu Leu Glu Glu
                805                 810                 815

Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
            820                 825                 830
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```
Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
        835                 840                 845

Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser Ile
    850                 855                 860

Ser Asp Ser Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Asp Asp Ser
865                 870                 875                 880

His Phe Ile Ser Phe Glu Asp Ile Ser Lys Thr Glu Asp Gly Phe Ser
                885                 890                 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Glu Ile Phe Ser Glu Tyr Ala Asn His Ile Arg Arg Glu Ile
        915                 920                 925

Ser Asn Ile Lys Asp Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Ala Ile His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Gly Tyr Ser Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Val  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035
```

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Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp Pro
1040 1045 1050

Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala Val
1055 1060 1065

Asn Leu Thr Ala Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu Gly
1070 1075 1080

Ile Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile
1085 1090 1095

Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg
1100 1105 1110

Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Ile Ser Leu
1115 1120 1125

Val Glu Thr Glu Gly Ala Phe Thr Leu Leu Asp Asp Lys Ile Met
1130 1135 1140

Ile Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asn Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ser Pro Thr Ile Thr Tyr Ile Lys Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

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Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Glu Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp His Tyr Lys Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Asn Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu His Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe His Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Asp Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Asp Asn Lys Ile Ile Leu
1370 1375 1380

Asn His His Glu Ile Asn Phe Ser Gly Asp Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Ile Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

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```
Ser Gly  Glu Leu Lys Ile Leu  Met Leu Asn Ser Asn  His Ile Gln
    1430                1435                1440

Gln Lys  Ile Asp Tyr Ile Gly  Phe Asn Ser Glu Leu  Gln Lys Asn
    1445                1450                1455

Ile Pro  Tyr Ser Phe Val Asp  Ser Glu Gly Lys Glu  Asn Gly Phe
    1460                1465                1470

Ile Asn  Gly Ser Thr Lys Glu  Gly Leu Phe Val Ser  Glu Leu Pro
    1475                1480                1485

Asp Val  Val Leu Ile Ser Lys  Val Tyr Met Asp Asp  Ser Lys Pro
    1490                1495                1500

Ser Phe  Gly Tyr Tyr Ser Asn  Asn Leu Lys Asp Val  Lys Val Ile
    1505                1510                1515

Thr Lys  Asp Asn Val Asn Ile  Leu Thr Gly Tyr Tyr  Leu Lys Asp
    1520                1525                1530

Asp Ile  Lys Ile Ser Leu Ser  Phe Thr Leu Gln Asp  Glu Lys Thr
    1535                1540                1545

Ile Lys  Leu Asn Gly Val His  Leu Asp Glu Ser Gly  Val Ala Glu
    1550                1555                1560

Ile Leu  Lys Phe Met Asn Lys  Lys Gly Ser Thr Asn  Thr Ser Asp
    1565                1570                1575

Ser Leu  Met Ser Phe Leu Glu  Ser Val Asn Ile Lys  Ser Ile Phe
    1580                1585                1590

Val Asn  Phe Leu Gln Ser Lys  Ile Asn Phe Ile Leu  Asp Ala Asn
    1595                1600                1605

Phe Ile  Ile Ser Gly Thr Thr  Ser Ile Gly Gln Phe  Glu Phe Ile
    1610                1615                1620
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```
Cys Asp  Glu Asn Asp Asn Ile  Gln Pro Tyr Phe Ile  Lys Phe Asn
    1625                1630                1635

Thr Leu  Glu Thr Thr Tyr Thr  Leu Tyr Val Gly Asn  Arg Gln Asn
    1640                1645                1650

Met Ile  Val Glu Pro Asn Tyr  Asp Leu Asp Asp Ser  Gly Asp Ile
    1655                1660                1665

Ser Ser  Thr Val Ile Asn Phe  Ser Gln Lys Tyr Leu  Tyr Gly Ile
    1670                1675                1680

Asp Ser  Cys Val Asn Lys Val  Val Ile Ser Pro Asn  Ile Tyr Thr
    1685                1690                1695

Asp Glu  Ile Asn Ile Thr Pro  Val Tyr Glu Thr Asn  Asn Asn Tyr
    1700                1705                1710

Pro Glu  Val Ile Val Leu Asp  Ala Asn Tyr Ile Asn  Glu Lys Ile
    1715                1720                1725

Asn Val  Asn Ile Asn Asp Leu  Ser Ile Arg Tyr Val  Trp Ser Asn
    1730                1735                1740

Asp Gly  Asn Asp Phe Ile Leu  Met Ser Thr Ser Glu  Glu Asn Lys
    1745                1750                1755

Val Ser  Gln Val Lys Ile Arg  Phe Val Asn Val Phe  Lys Asp Lys
    1760                1765                1770

Thr Leu  Ala Asn Lys Leu Ser  Phe Asn Phe Ser Asp  Lys Gln Asp
    1775                1780                1785

Val Pro  Val Ser Glu Ile Ile  Ser Ala Phe Thr Pro  Ser Tyr Tyr
    1790                1795                1800

Glu Asp  Gly Leu Ile Gly Tyr  Asp Leu Gly Leu Val  Ser Leu Tyr
    1805                1810                1815
```

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Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Thr Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asn Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Ile Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Leu Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Glu
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met Tyr Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Ile
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Lys Lys Tyr Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Ile Glu Ile Asp Gly
2000 2005 2010

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Lys Tyr Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Ser Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Ala Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Tyr Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Val Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asn Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Glu Lys Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Glu Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Asp Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Ile Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

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Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Asn Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asp Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Gln
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

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<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
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<400> 756

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Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
            20                  25                  30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
```

195 200 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
210 215 220

Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val Arg
225 230 235 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu Gln
245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
260 265 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Ala Val Ala Met
275 280 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
290 295 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala

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405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Thr Phe Asp Asp Ala Arg Ala Lys Val
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
530 535 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545 550 555 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
565 570 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
580 585 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Ile Leu Phe Gln
595 600 605

Lys Asn Ile Glu Asn Ser Glu Val Ala Tyr Tyr Tyr Asn Pro Gly Asp

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610 615 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Arg Ile Pro Ser Ile Ile Ser
625 630 635 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
645 650 655

Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser Thr
660 665 670

Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Ser Lys
675 680 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
690 695 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705 710 715 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
725 730 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Asn Glu Gly Arg Arg Glu
740 745 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
755 760 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
770 775 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785 790 795 800

Gln Glu Ile Arg Asn Asn Ser Asn Leu Ser Asp Ile Glu Leu Glu Glu
805 810 815

Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp

820 825 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
835 840 845

Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser Ile
850 855 860

Ser Asp Ser Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Asp Asp Ser
865 870 875 880

His Phe Ile Ser Phe Glu Asp Ile Ser Lys Thr Glu Asp Gly Phe Ser
885 890 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
900 905 910

Glu Lys Glu Ile Phe Ser Glu Tyr Ala Asn His Ile Arg Arg Glu Ile
915 920 925

Ser Asn Ile Lys Asp Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
930 935 940

Lys Lys Val Asn Leu Asp Ala Ile His Glu Val Asn Thr Leu Asn Ala
945 950 955 960

Ala Phe Phe Ile Gln Ser Leu Ile Gly Tyr Ser Ser Ser Lys Glu Ser
965 970 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
980 985 990

Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp Ala Ala Lys Val Val Glu
995 1000 1005

Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu Pro Thr
1010 1015 1020

Leu Ser Glu Gly Leu Pro Val Ile Ala Thr Ile Ile Asp Gly Val

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1025 1030 1035

Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp Pro
1040 1045 1050

Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala Val
1055 1060 1065

Asn Leu Thr Ala Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu Gly
1070 1075 1080

Ile Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile
1085 1090 1095

Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg
1100 1105 1110

Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Ile Ser Leu
1115 1120 1125

Val Glu Thr Glu Gly Ala Phe Thr Leu Leu Asp Asp Lys Ile Met
1130 1135 1140

Ile Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asn Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ser Pro Thr Ile Thr Tyr Ile Lys Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr

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1220                1225                1230

Gly Trp  Thr Pro Gly Leu Arg  Ser Leu Glu Asn Glu  Gly Thr Lys
1235                1240                1245

Leu Leu  Asp Arg Ile Arg Asp  His Tyr Lys Gly Glu  Phe Tyr Trp
1250                1255                1260

Arg Tyr  Phe Ala Phe Ile Ala  Asp Ala Leu Ile Thr  Thr Leu Lys
1265                1270                1275

Pro Arg  Tyr Glu Asp Thr Asn  Ile Arg Ile Asn Leu  Asp Ser Asn
1280                1285                1290

Asn Arg  Ser Phe Ile Val Pro  Ile Ile Thr Thr Glu  His Ile Arg
1295                1300                1305

Glu Lys  Leu Ser Tyr Ser Phe  His Gly Ser Gly Gly  Thr Tyr Ala
1310                1315                1320

Leu Ser  Leu Ser Gln Tyr Asn  Met Gly Ile Asn Ile  Glu Leu Ser
1325                1330                1335

Glu Ser  Asp Val Trp Ile Ile  Asp Val Asp Asn Val  Val Arg Asp
1340                1345                1350

Val Thr  Ile Asp Ser Asp Lys  Ile Lys Lys Gly Asp  Leu Ile Glu
1355                1360                1365

Gly Ile  Leu Ser Thr Leu Ser  Ile Glu Asp Asn Lys  Ile Ile Leu
1370                1375                1380

Asn His  His Glu Ile Asn Phe  Ser Gly Asp Val Asn  Gly Ser Asn
1385                1390                1395

Gly Phe  Ile Ser Leu Thr Phe  Ser Ile Leu Glu Gly  Ile Asn Ala
1400                1405                1410

Ile Ile  Glu Val Asp Leu Leu  Ser Lys Ser Tyr Lys  Leu Leu Ile
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1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Phe Thr Leu Gln Asp Glu Lys Thr
1535 1540 1545

Ile Lys Leu Asn Gly Val His Leu Asp Glu Ser Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Lys Lys Gly Ser Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Val Asn Ile Lys Ser Ile Phe
1580 1585 1590

Val Asn Phe Leu Gln Ser Lys Ile Asn Phe Ile Leu Asp Ala Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile

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1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Thr Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Asn Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Ser Ala Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr

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1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Thr Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asn Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Ile Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Leu Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Glu
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met Tyr Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Ile
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Lys Lys Tyr Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Ile Glu Ile Asp Gly

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2000 2005 2010

Lys Tyr Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Ser Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Ala Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Tyr Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Val Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asn Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Glu Lys Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Glu Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Asp Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Ile Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr

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2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Asn Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asp Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Gln
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 757
<211> 2365
<212> PRT
<213> Artificial Sequence

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<220>
<223> Synthetic amino acid sequence

<400> 757

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Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1               5                  10                  15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
            20                  25                  30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190
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```
Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400
```

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```
Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Glu Met Ala Ser Leu Trp Thr Phe Asp Asp Ala Arg Ala Lys Val
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545                 550                 555                 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
            580                 585                 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Ile Leu Phe Gln
        595                 600                 605
```

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```
Lys Asn Ile Glu Asn Ser Glu Val Ala Tyr Tyr Tyr Asn Pro Gly Asp
    610                 615                 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Arg Ile Pro Ser Ile Ile Ser
625                 630                 635                 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
                645                 650                 655

Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser Thr
            660                 665                 670

Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Ser Lys
        675                 680                 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
    690                 695                 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705                 710                 715                 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
                725                 730                 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Asn Glu Gly Arg Arg Glu
            740                 745                 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
        755                 760                 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
    770                 775                 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785                 790                 795                 800

Gln Glu Ile Arg Asn Asn Ser Asn Leu Ser Asp Ile Glu Leu Glu Glu
                805                 810                 815
```

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```
Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
            820                 825                 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
        835                 840                 845

Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser Ile
    850                 855                 860

Ser Asp Ser Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Asp Asp Ser
865                 870                 875                 880

His Phe Ile Ser Phe Glu Asp Ile Ser Lys Thr Glu Asp Gly Phe Ser
                885                 890                 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Glu Ile Phe Ser Glu Tyr Ala Asn His Ile Glu Arg Glu Ile
        915                 920                 925

Ser Asn Ile Lys Asp Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Ala Ile His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Gly Tyr Ser Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005

Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020
```

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Leu Ser Glu Gly Leu Pro Val Ile Ala Thr Ile Ile Asp Gly Val
1025 1030 1035

Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp Pro
1040 1045 1050

Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala Val
1055 1060 1065

Asn Leu Thr Ala Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu Gly
1070 1075 1080

Ile Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile
1085 1090 1095

Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg
1100 1105 1110

Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Ile Ser Leu
1115 1120 1125

Val Glu Thr Glu Gly Ala Phe Thr Leu Leu Asp Asp Lys Ile Met
1130 1135 1140

Ile Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asn Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ser Pro Thr Ile Thr Tyr Ile Lys Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

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```
Met Val  Leu Pro Asn Ala Pro  Asn Arg Val Phe Ala  Trp Glu Thr
    1220                1225                1230

Gly Trp  Thr Pro Gly Leu Arg  Ser Leu Glu Asn Glu  Gly Thr Lys
    1235                1240                1245

Leu Leu  Asp Arg Ile Arg Asp  His Tyr Lys Gly Glu  Phe Tyr Trp
    1250                1255                1260

Arg Tyr  Phe Ala Phe Ile Ala  Asp Ala Leu Ile Thr  Thr Leu Lys
    1265                1270                1275

Pro Arg  Tyr Glu Asp Thr Asn  Ile Arg Ile Asn Leu  Asp Ser Asn
    1280                1285                1290

Asn Arg  Ser Phe Ile Val Pro  Ile Ile Thr Thr Glu  His Ile Arg
    1295                1300                1305

Glu Lys  Leu Ser Tyr Ser Phe  His Gly Ser Gly Gly  Thr Tyr Ala
    1310                1315                1320

Leu Ser  Leu Ser Gln Tyr Asn  Met Gly Ile Asn Ile  Glu Leu Ser
    1325                1330                1335

Glu Ser  Asp Val Trp Ile Ile  Asp Val Asp Asn Val  Val Arg Asp
    1340                1345                1350

Val Thr  Ile Asp Ser Asp Lys  Ile Lys Lys Gly Asp  Leu Ile Glu
    1355                1360                1365

Gly Ile  Leu Ser Thr Leu Ser  Ile Glu Asp Asn Lys  Ile Ile Leu
    1370                1375                1380

Asn His  His Glu Ile Asn Phe  Ser Gly Asp Val Asn  Gly Ser Asn
    1385                1390                1395

Gly Phe  Ile Ser Leu Thr Phe  Ser Ile Leu Glu Gly  Ile Asn Ala
    1400                1405                1410
```

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Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Phe Thr Leu Gln Asp Glu Lys Thr
1535 1540 1545

Ile Lys Leu Asn Gly Val His Leu Asp Glu Ser Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Lys Lys Gly Ser Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Val Asn Ile Lys Ser Ile Phe
1580 1585 1590

Val Asn Phe Leu Gln Ser Lys Ile Asn Phe Ile Leu Asp Ala Asn
1595 1600 1605

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Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Thr Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Asn Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Ser Ala Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

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Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Thr Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asn Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Ile Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Leu Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Glu
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met Tyr Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Ile
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Lys Lys Tyr Tyr Phe
1985 1990 1995

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Asp Asp Ser Gly Val Met Lys Val Gly Tyr Ile Glu Ile Asp Gly
2000 2005 2010

Lys Tyr Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Ser Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Ala Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Tyr Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Val Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asn Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Glu Lys Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Glu Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Asp Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

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```
Gly Glu  Asp Ile Tyr Tyr Phe  Gly Glu Thr Tyr Thr  Ile Glu Thr
    2195                 2200                 2205

Gly Trp  Ile Tyr Asp Met Glu  Asn Glu Ser Asp Lys  Tyr Tyr Phe
    2210                 2215                 2220

Asn Pro  Glu Thr Lys Lys Ala  Cys Lys Gly Ile Asn  Leu Ile Asp
    2225                 2230                 2235

Asp Ile  Lys Tyr Tyr Phe Asp  Glu Asn Gly Ile Met  Arg Thr Gly
    2240                 2245                 2250

Leu Ile  Ser Phe Glu Asn Asn  Asp Tyr Tyr Phe Asn  Glu Asn Gly
    2255                 2260                 2265

Glu Met  Gln Phe Gly Tyr Ile  Asn Ile Glu Asp Lys  Met Phe Tyr
    2270                 2275                 2280

Phe Gly  Glu Asp Gly Val Met  Gln Ile Gly Val Phe  Asn Thr Gln
    2285                 2290                 2295

Asp Gly  Phe Lys Tyr Phe Ala  His Gln Asn Thr Leu  Asp Glu Asn
    2300                 2305                 2310

Phe Glu  Gly Glu Ser Ile Asn  Tyr Thr Gly Trp Leu  Asp Leu Asp
    2315                 2320                 2325

Glu Lys  Arg Tyr Tyr Phe Thr  Asp Glu Tyr Ile Ala  Ala Thr Gly
    2330                 2335                 2340

Ser Val  Ile Ile Asp Gly Glu  Glu Tyr Tyr Phe Asp  Pro Asp Thr
    2345                 2350                 2355

Ala Gln  Leu Val Ile Ser Glu
    2360                 2365


<210>  758
<211>  2365
<212>  PRT
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<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 758

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Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1               5                  10                  15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
            20                  25                  30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
```

```
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Gly Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
```

385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Thr Phe Asp Asp Ala Arg Ala Lys Val
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
530 535 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545 550 555 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
565 570 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
580 585 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Ile Leu Phe Gln

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595 600 605

Lys Asn Ile Glu Asn Ser Glu Val Ala Tyr Tyr Tyr Asn Pro Gly Asp
610 615 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Arg Ile Pro Ser Ile Ile Ser
625 630 635 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
645 650 655

Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser Thr
660 665 670

Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Ser Lys
675 680 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
690 695 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705 710 715 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
725 730 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Asn Glu Gly Arg Arg Glu
740 745 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
755 760 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
770 775 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785 790 795 800

Gln Glu Ile Arg Asn Asn Ser Asn Leu Ser Asp Ile Glu Leu Glu Glu

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805 810 815

Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
820 825 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
835 840 845

Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser Ile
850 855 860

Ser Asp Ser Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Asp Asp Ser
865 870 875 880

His Phe Ile Ser Phe Glu Asp Ile Ser Lys Thr Glu Asp Gly Phe Ser
885 890 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
900 905 910

Glu Lys Glu Ile Phe Ser Glu Tyr Ala Asn His Ile Arg Gly Glu Ile
915 920 925

Ser Asn Ile Lys Asp Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
930 935 940

Lys Lys Val Asn Leu Asp Ala Ile His Glu Val Asn Thr Leu Asn Ala
945 950 955 960

Ala Phe Phe Ile Gln Ser Leu Ile Gly Tyr Ser Ser Ser Lys Glu Ser
965 970 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
980 985 990

Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp Ala Ala Lys Val Val Glu
995 1000 1005

Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu Pro Thr

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1010 1015 1020

Leu Ser Glu Gly Leu Pro Val Ile Ala Thr Ile Ile Asp Gly Val
1025 1030 1035

Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp Pro
1040 1045 1050

Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala Val
1055 1060 1065

Asn Leu Thr Ala Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu Gly
1070 1075 1080

Val Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile
1085 1090 1095

Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg
1100 1105 1110

Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Ile Ser Leu
1115 1120 1125

Val Glu Thr Glu Gly Ala Phe Thr Leu Leu Asp Asp Lys Ile Met
1130 1135 1140

Ile Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asn Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ser Pro Thr Ile Thr Tyr Ile Lys Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu

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1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Glu Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp His Tyr Lys Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Asn Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu His Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe His Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Asp Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Asp Asn Lys Ile Ile Leu
1370 1375 1380

Asn His His Glu Ile Asn Phe Ser Gly Asp Val Asn Gly Ser Asn
1385 1390 1395

Gly Phe Ile Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala

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1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Phe Thr Leu Gln Asp Glu Lys Thr
1535 1540 1545

Ile Lys Leu Asn Gly Val His Leu Asp Glu Ser Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Lys Lys Gly Ser Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Val Asn Ile Lys Ser Ile Phe
1580 1585 1590

Val Asn Phe Leu Gln Ser Lys Ile Asn Phe Ile Leu Asp Ala Asn

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1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Thr Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Asn Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Ser Ala Phe Thr Pro Ser Tyr Tyr

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1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Thr Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asn Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Ile Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Leu Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Glu
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met Tyr Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Ile
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Lys Lys Tyr Tyr Phe

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1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Ile Glu Ile Asp Gly
2000 2005 2010

Lys Tyr Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Ser Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Ala Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Tyr Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Val Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asn Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Glu Lys Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Glu Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Asp Tyr Ser Gly Leu Val Arg Val

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2180 2185 2190

Gly Glu Asp Ile Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Asn Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asp Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Gln
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

<210> 759

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<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 759

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Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1               5                  10                  15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
            20                  25                  30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
        35                  40                  45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
    50                  55                  60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65                  70                  75                  80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
            100                 105                 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
        115                 120                 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
    130                 135                 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145                 150                 155                 160

Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175
```

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```
Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380
```

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```
Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Glu Met Ala Ser Leu Trp Thr Phe Asp Asp Ala Arg Ala Lys Val
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545                 550                 555                 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
            580                 585                 590
```

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```
Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Ile Leu Phe Gln
        595                 600                 605

Lys Asn Ile Glu Asn Ser Glu Val Ala Tyr Tyr Tyr Asn Pro Gly Asp
    610                 615                 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Arg Ile Pro Ser Ile Ile Ser
625                 630                 635                 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
                645                 650                 655

Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser Thr
            660                 665                 670

Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Ser Lys
        675                 680                 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
    690                 695                 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705                 710                 715                 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
                725                 730                 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Asn Glu Gly Arg Arg Glu
            740                 745                 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
        755                 760                 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
    770                 775                 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785                 790                 795                 800
```

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```
Gln Glu Ile Arg Asn Asn Ser Asn Leu Ser Asp Ile Glu Leu Glu Glu
                805                 810                 815

Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
            820                 825                 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
        835                 840                 845

Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser Ile
    850                 855                 860

Ser Asp Ser Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Asp Asp Ser
865                 870                 875                 880

His Phe Ile Ser Phe Glu Asp Ile Ser Lys Thr Glu Asp Gly Phe Ser
                885                 890                 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Glu Ile Phe Ser Glu Tyr Ala Asn His Ile Arg Arg Glu Ile
        915                 920                 925

Ser Asn Ile Lys Asp Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Ala Ile His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Gly Tyr Ser Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990

Phe Ser Thr Gly Leu Asn Thr Ile  Thr Asp Ala Ala Lys  Val Val Glu
        995                 1000                1005
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```
Leu Val  Ser Thr Ala Leu Asp  Glu Thr Ile Asp Leu  Leu Pro Thr
    1010                1015                1020

Leu Ser  Glu Gly Leu Pro Val  Ile Ala Thr Ile Ile  Asp Gly Val
    1025                1030                1035

Ser Leu  Gly Ala Ala Ile Lys  Glu Leu Ser Glu Thr  Ser Asp Pro
    1040                1045                1050

Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile Gly Ile  Met Ala Val
    1055                1060                1065

Asn Leu  Thr Ala Ala Thr Thr  Ala Ile Ile Thr Ser  Ser Leu Gly
    1070                1075                1080

Ile Ala  Ser Gly Phe Ser Ile  Leu Leu Val Pro Leu  Ala Gly Ile
    1085                1090                1095

Ser Ala  Gly Ile Pro Ser Leu  Val Asn Asn Glu Leu  Val Leu Arg
    1100                1105                1110

Asp Lys  Ala Thr Lys Val Val  Asp Tyr Phe Lys His  Ile Ser Leu
    1115                1120                1125

Val Glu  Thr Glu Gly Ala Phe  Thr Leu Leu Asp Asp  Lys Ile Met
    1130                1135                1140

Ile Pro  Gln Asp Asp Leu Val  Ile Ser Glu Ile Asp  Phe Asn Asn
    1145                1150                1155

Asn Ser  Ile Val Leu Gly Lys  Cys Glu Ile Trp Arg  Met Glu Gly
    1160                1165                1170

Gly Ser  Gly His Thr Val Thr  Asn Asp Ile Asp His  Phe Phe Ser
    1175                1180                1185

Ser Pro  Thr Ile Thr Tyr Ile  Lys Pro His Leu Ser  Ile Tyr Asp
    1190                1195                1200
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```
Val Leu  Glu Val Gln Lys Glu  Glu Leu Asp Leu Ser  Lys Asp Leu
    1205                 1210                 1215

Met Val  Leu Pro Asn Ala Pro  Asn Arg Val Phe Ala  Trp Glu Thr
    1220                 1225                 1230

Gly Trp  Thr Pro Gly Leu Arg  Ser Leu Glu Asn Glu  Gly Thr Lys
    1235                 1240                 1245

Leu Leu  Asp Arg Ile Arg Asp  His Tyr Lys Gly Glu  Phe Tyr Trp
    1250                 1255                 1260

Arg Tyr  Phe Ala Phe Ile Ala  Asp Ala Leu Ile Thr  Thr Leu Lys
    1265                 1270                 1275

Pro Arg  Tyr Glu Asp Thr Asn  Ile Arg Ile Asn Leu  Asp Ser Asn
    1280                 1285                 1290

Asn Arg  Ser Phe Ile Val Pro  Ile Ile Thr Thr Glu  His Ile Arg
    1295                 1300                 1305

Glu Lys  Leu Ser Tyr Ser Phe  His Gly Ser Gly Gly  Thr Tyr Ala
    1310                 1315                 1320

Leu Ser  Leu Ser Gln Tyr Asn  Met Gly Ile Asn Ile  Glu Leu Ser
    1325                 1330                 1335

Glu Ser  Asp Val Trp Ile Ile  Asp Val Asp Asn Val  Val Arg Asp
    1340                 1345                 1350

Val Thr  Ile Asp Ser Asp Lys  Ile Lys Lys Gly Asp  Leu Ile Glu
    1355                 1360                 1365

Gly Ile  Leu Ser Thr Leu Ser  Ile Glu Asp Asn Lys  Ile Ile Leu
    1370                 1375                 1380

Asn His  His Glu Ile Asn Phe  Ser Gly Asp Val Asn  Gly Ser Asn
    1385                 1390                 1395
```

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Gly Phe Ile Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Phe Thr Leu Gln Asp Glu Lys Thr
1535 1540 1545

Ile Lys Leu Asn Gly Val His Leu Asp Glu Ser Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Lys Lys Gly Ser Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Val Asn Ile Lys Ser Ile Phe
1580 1585 1590

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```
Val Asn  Phe Leu Gln Ser Lys  Ile Asn Phe Ile Leu  Asp Ala Asn
    1595                1600                1605

Phe Ile  Ile Ser Gly Thr Thr  Ser Ile Gly Gln Phe  Glu Phe Ile
    1610                1615                1620

Cys Asp  Glu Asn Asp Asn Ile  Gln Pro Tyr Phe Ile  Lys Phe Asn
    1625                1630                1635

Thr Leu  Glu Thr Thr Tyr Thr  Leu Tyr Val Gly Asn  Arg Gln Asn
    1640                1645                1650

Met Ile  Val Glu Pro Asn Tyr  Asp Leu Asp Asp Ser  Gly Asp Ile
    1655                1660                1665

Ser Ser  Thr Val Ile Asn Phe  Ser Gln Lys Tyr Leu  Tyr Gly Ile
    1670                1675                1680

Asp Ser  Cys Val Asn Lys Val  Val Ile Ser Pro Asn  Ile Tyr Thr
    1685                1690                1695

Asp Glu  Ile Asn Ile Thr Pro  Val Tyr Glu Thr Asn  Asn Asn Tyr
    1700                1705                1710

Pro Glu  Val Ile Val Leu Asp  Ala Asn Tyr Ile Asn  Glu Lys Ile
    1715                1720                1725

Asn Val  Asn Ile Asn Asp Leu  Ser Ile Arg Tyr Val  Trp Ser Asn
    1730                1735                1740

Asp Gly  Asn Asp Phe Ile Leu  Met Ser Thr Ser Glu  Glu Asn Lys
    1745                1750                1755

Val Ser  Gln Val Lys Ile Arg  Phe Val Asn Val Phe  Lys Asp Lys
    1760                1765                1770

Thr Leu  Ala Asn Lys Leu Ser  Phe Asn Phe Ser Asp  Lys Gln Asp
    1775                1780                1785
```

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```
Val Pro  Val Ser Glu Ile Ile  Ser Ala Phe Thr Pro  Ser Tyr Tyr
    1790                 1795                 1800

Glu Asp  Gly Leu Ile Gly Tyr  Asp Leu Gly Leu Val  Ser Leu Tyr
    1805                 1810                 1815

Asn Glu  Lys Phe Tyr Ile Asn  Asn Phe Gly Met Met  Val Ser Gly
    1820                 1825                 1830

Leu Ile  Tyr Ile Asn Asp Ser  Leu Tyr Tyr Phe Lys  Pro Pro Val
    1835                 1840                 1845

Asn Asn  Leu Ile Thr Gly Phe  Val Thr Val Gly Asp  Asp Lys Tyr
    1850                 1855                 1860

Tyr Phe  Asn Pro Thr Asn Gly  Gly Ala Ala Ser Ile  Gly Glu Thr
    1865                 1870                 1875

Ile Ile  Asn Asp Lys Asn Tyr  Tyr Phe Asn Gln Ser  Gly Ile Leu
    1880                 1885                 1890

Gln Thr  Gly Val Phe Ser Thr  Glu Asp Gly Leu Lys  Tyr Phe Ala
    1895                 1900                 1905

Pro Ala  Asn Thr Leu Asp Glu  Asn Leu Glu Gly Glu  Ala Ile Asp
    1910                 1915                 1920

Phe Thr  Gly Lys Leu Ile Ile  Asp Glu Asn Ile Tyr  Tyr Phe Glu
    1925                 1930                 1935

Asp Asn  Tyr Arg Gly Ala Val  Glu Trp Lys Glu Leu  Asp Gly Glu
    1940                 1945                 1950

Met Tyr  Tyr Phe Ser Pro Glu  Thr Gly Lys Ala Phe  Lys Gly Leu
    1955                 1960                 1965

Asn Gln  Ile Gly Asp Asp Lys  Tyr Tyr Phe Asn Ser  Asp Gly Ile
    1970                 1975                 1980
```

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Met Gln Lys Gly Phe Val Ser Ile Asn Asp Lys Lys Tyr Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Ile Glu Ile Asp Gly
2000 2005 2010

Lys Tyr Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Ser Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Ala Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Tyr Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Val Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asn Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Glu Lys Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Glu Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

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Asn Ile Tyr Gly Gln Ala Val Asp Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Ile Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Asn Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asp Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Gln
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu
2360 2365

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<210> 760
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 760

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
1 5 10 15

Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Ile
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Ile
130 135 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145 150 155 160

Asn Asn Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu

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165 170 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
180 185 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Ile Tyr
195 200 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
210 215 220

Glu Glu Ser Leu Asn Lys Ile Lys Gln Asn Ser Gly Asn Asp Val Arg
225 230 235 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Lys Leu Tyr Glu Gln
245 250 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
260 265 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Ala Val Ala Met
275 280 285

Leu Pro Gly Ile Gln Pro Gly Leu Phe Glu Ser Ile Glu Lys Pro Ser
290 295 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305 310 315 320

Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp Met
325 330 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Ala Leu Ala Ser Lys
340 345 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
355 360 365

Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln

370 375 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385 390 395 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
405 410 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
420 425 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
435 440 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
450 455 460

Val Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465 470 475 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
485 490 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
500 505 510

Gln Glu Met Ala Ser Leu Trp Thr Phe Asp Asp Ala Arg Ala Lys Val
515 520 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
530 535 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545 550 555 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
565 570 575

Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala

580 585 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Ile Leu Phe Gln
595 600 605

Lys Asn Ile Glu Asn Ser Glu Val Ala Tyr Tyr Tyr Asn Pro Gly Asp
610 615 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Arg Ile Pro Ser Ile Ile Ser
625 630 635 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
645 650 655

Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser Thr
660 665 670

Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Ser Lys
675 680 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
690 695 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705 710 715 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
725 730 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Asn Glu Gly Arg Arg Glu
740 745 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
755 760 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
770 775 780

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu

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785 790 795 800

Gln Glu Ile Arg Asn Asn Ser Asn Leu Ser Asp Ile Glu Leu Glu Glu
805 810 815

Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
820 825 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
835 840 845

Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser Ile
850 855 860

Ser Asp Ser Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Asp Asp Ser
865 870 875 880

His Phe Ile Ser Phe Glu Asp Ile Ser Lys Thr Glu Asp Gly Phe Ser
885 890 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
900 905 910

Glu Lys Glu Ile Phe Ser Glu Tyr Ala Asn His Ile Arg Gly Glu Ile
915 920 925

Ser Asn Ile Lys Asp Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
930 935 940

Lys Lys Val Asn Leu Asp Ala Ile His Glu Val Asn Thr Leu Asn Ala
945 950 955 960

Ala Phe Phe Ile Gln Ser Leu Ile Gly Tyr Ser Ser Ser Lys Glu Ser
965 970 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
980 985 990

Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp Ala Ala Lys Val Val Glu

995 1000 1005

Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu Pro Thr
1010 1015 1020

Leu Ser Glu Gly Leu Pro Val Ile Ala Thr Ile Ile Asp Gly Val
1025 1030 1035

Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp Pro
1040 1045 1050

Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala Val
1055 1060 1065

Asn Leu Thr Ala Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu Gly
1070 1075 1080

Val Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile
1085 1090 1095

Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg
1100 1105 1110

Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Ile Ser Leu
1115 1120 1125

Val Glu Thr Glu Gly Ala Phe Thr Leu Leu Asp Asp Lys Ile Met
1130 1135 1140

Ile Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asn Asp Ile Asp His Phe Phe Ser
1175 1180 1185

Ser Pro Thr Ile Thr Tyr Ile Lys Pro His Leu Ser Ile Tyr Asp

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1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Glu Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp His Tyr Lys Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Asn Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu His Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe His Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Asp Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Asp Asn Lys Ile Ile Leu
1370 1375 1380

Asn His His Glu Ile Asn Phe Ser Gly Asp Val Asn Gly Ser Asn

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1385 1390 1395

Gly Phe Ile Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala
1400 1405 1410

Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
1415 1420 1425

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
1430 1435 1440

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn
1445 1450 1455

Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe
1460 1465 1470

Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
1475 1480 1485

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro
1490 1495 1500

Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile
1505 1510 1515

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
1520 1525 1530

Asp Ile Lys Ile Ser Leu Ser Phe Thr Leu Gln Asp Glu Lys Thr
1535 1540 1545

Ile Lys Leu Asn Gly Val His Leu Asp Glu Ser Gly Val Ala Glu
1550 1555 1560

Ile Leu Lys Phe Met Asn Lys Lys Gly Ser Thr Asn Thr Ser Asp
1565 1570 1575

Ser Leu Met Ser Phe Leu Glu Ser Val Asn Ile Lys Ser Ile Phe

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1580 1585 1590

Val Asn Phe Leu Gln Ser Lys Ile Asn Phe Ile Leu Asp Ala Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Thr Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Asn Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp

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1775 1780 1785

Val Pro Val Ser Glu Ile Ile Ser Ala Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Thr Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asn Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Ile Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Leu Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Glu
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met Tyr Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

Asn Gln Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Ser Asp Gly Ile

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1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Lys Lys Tyr Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Ile Glu Ile Asp Gly
2000 2005 2010

Lys Tyr Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Ser Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Ala Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Tyr Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Val Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asn Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Glu Lys Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

Ser Asp Glu Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp

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2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Asp Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Ile Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Asn Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asp Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Gln
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

Ala Gln Leu Val Ile Ser Glu

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2360 2365

<210> 761
<211> 2365
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic amino acid sequence

<400> 761

Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg Phe
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Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu Glu
20 25 30

Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys Leu
35 40 45

Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys Lys
50 55 60

Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val Thr
65 70 75 80

Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile Asn
100 105 110

Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn Val
115 120 125

Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr Val
130 135 140

Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn Leu
145 150 155 160

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Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met Glu
                165                 170                 175

Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala Gln
            180                 185                 190

Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr Tyr
        195                 200                 205

Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr Ile
    210                 215                 220

Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val Arg
225                 230                 235                 240

Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu Gln
                245                 250                 255

Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu Arg
            260                 265                 270

Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Ala Val Ala Met
        275                 280                 285

Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro Ser
    290                 295                 300

Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp Met
                325                 330                 335

Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser Lys
            340                 345                 350

Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala Ser
        355                 360                 365
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Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn Gln
    370                 375                 380

Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val Lys
385                 390                 395                 400

Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro Ala
                405                 410                 415

Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile Asp
            420                 425                 430

Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met Glu
        435                 440                 445

Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr Thr
    450                 455                 460

Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp Leu
465                 470                 475                 480

Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala Asp
                485                 490                 495

Leu Arg Asn Phe Glu Ile Ser Lys Thr Asn Ile Ser Gln Ser Thr Glu
            500                 505                 510

Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys Ala
        515                 520                 525

Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly Glu
    530                 535                 540

Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu Tyr
545                 550                 555                 560

Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly Tyr
                565                 570                 575
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Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu Ala
            580                 585                 590

Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe Gln
        595                 600                 605

Lys Asn Ile Glu Asp Ser Glu Ile Ala Tyr Tyr Tyr Asn Pro Gly Asp
    610                 615                 620

Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile Ser
625                 630                 635                 640

Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp Glu
                645                 650                 655

Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser Thr
            660                 665                 670

Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro Lys
        675                 680                 685

Ser Ile Glu Ile Asn Leu Leu Gly Ala Asn Met Phe Ser Tyr Ser Ile
    690                 695                 700

Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys Asp
705                 710                 715                 720

Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile Val
                725                 730                 735

Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg Glu
            740                 745                 750

Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile Ile
        755                 760                 765

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
    770                 775                 780
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Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
785                 790                 795                 800

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
                805                 810                 815

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
            820                 825                 830

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
        835                 840                 845

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
    850                 855                 860

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
865                 870                 875                 880

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
                885                 890                 895

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
            900                 905                 910

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
        915                 920                 925

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
    930                 935                 940

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
945                 950                 955                 960

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
                965                 970                 975

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
            980                 985                 990
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Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp Ala Ala Lys Val Val Glu
995 1000 1005

Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu Pro Thr
1010 1015 1020

Leu Ser Glu Gly Leu Pro Ile Ile Ala Thr Ile Ile Asp Gly Val
1025 1030 1035

Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp Pro
1040 1045 1050

Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala Val
1055 1060 1065

Asn Leu Thr Thr Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu Gly
1070 1075 1080

Ile Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile
1085 1090 1095

Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg
1100 1105 1110

Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Val Ser Leu
1115 1120 1125

Val Glu Thr Glu Gly Val Phe Thr Leu Leu Asp Asp Lys Ile Met
1130 1135 1140

Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
1145 1150 1155

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly
1160 1165 1170

Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe Ser
1175 1180 1185

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Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr Asp
1190 1195 1200

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu
1205 1210 1215

Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr
1220 1225 1230

Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr Lys
1235 1240 1245

Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr Trp
1250 1255 1260

Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
1265 1270 1275

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
1280 1285 1290

Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile Arg
1295 1300 1305

Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala
1310 1315 1320

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
1325 1330 1335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp
1340 1345 1350

Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu
1355 1360 1365

Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile Leu
1370 1375 1380

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Asn Ser  His Glu Ile Asn Phe  Ser Gly Glu Val Asn  Gly Ser Asn
    1385                1390                1395

Gly Phe  Val Ser Leu Thr Phe  Ser Ile Leu Glu Gly  Ile Asn Ala
    1400                1405                1410

Ile Ile  Glu Val Asp Leu Leu  Ser Lys Ser Tyr Lys  Leu Leu Ile
    1415                1420                1425

Ser Gly  Glu Leu Lys Ile Leu  Met Leu Asn Ser Asn  His Ile Gln
    1430                1435                1440

Gln Lys  Ile Asp Tyr Ile Gly  Phe Asn Ser Glu Leu  Gln Lys Asn
    1445                1450                1455

Ile Pro  Tyr Ser Phe Val Asp  Ser Glu Gly Lys Glu  Asn Gly Phe
    1460                1465                1470

Ile Asn  Gly Ser Thr Lys Glu  Gly Leu Phe Val Ser  Glu Leu Pro
    1475                1480                1485

Asp Val  Val Leu Ile Ser Lys  Val Tyr Met Asp Asp  Ser Lys Pro
    1490                1495                1500

Ser Phe  Gly Tyr Tyr Ser Asn  Asn Leu Lys Asp Val  Lys Val Ile
    1505                1510                1515

Thr Lys  Asp Asn Val Asn Ile  Leu Thr Gly Tyr Tyr  Leu Lys Asp
    1520                1525                1530

Asp Ile  Lys Ile Ser Leu Ser  Leu Thr Leu Gln Asp  Glu Lys Thr
    1535                1540                1545

Ile Lys  Leu Asn Ser Val His  Leu Asp Glu Ser Gly  Val Ala Glu
    1550                1555                1560

Ile Leu  Lys Phe Met Asn Arg  Lys Gly Asn Thr Asn  Thr Ser Asp
    1565                1570                1575
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Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe
1580 1585 1590

Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala Asn
1595 1600 1605

Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
1610 1615 1620

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn
1625 1630 1635

Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn
1640 1645 1650

Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile
1655 1660 1665

Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
1670 1675 1680

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr
1685 1690 1695

Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr Tyr
1700 1705 1710

Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
1715 1720 1725

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn
1730 1735 1740

Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys
1745 1750 1755

Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
1760 1765 1770

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Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1775 1780 1785

Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr Tyr
1790 1795 1800

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
1805 1810 1815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1820 1825 1830

Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val
1835 1840 1845

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1850 1855 1860

Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1865 1870 1875

Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu
1880 1885 1890

Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala
1895 1900 1905

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1910 1915 1920

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp
1925 1930 1935

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1940 1945 1950

Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1955 1960 1965

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Asn Gln Ile Gly Asp Tyr Lys Tyr Tyr Phe Asn Ser Asp Gly Val
1970 1975 1980

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe
1985 1990 1995

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp Gly
2000 2005 2010

Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
2015 2020 2025

Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
2030 2035 2040

Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile
2045 2050 2055

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr
2060 2065 2070

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
2075 2080 2085

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile
2090 2095 2100

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
2105 2110 2115

Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser
2120 2125 2130

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
2135 2140 2145

Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
2150 2155 2160

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Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
2165 2170 2175

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
2180 2185 2190

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
2195 2200 2205

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
2210 2215 2220

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
2225 2230 2235

Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly
2240 2245 2250

Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly
2255 2260 2265

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
2270 2275 2280

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro
2285 2290 2295

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
2300 2305 2310

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp
2315 2320 2325

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
2330 2335 2340

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
2345 2350 2355

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Ala Gln Leu Val Ile Ser Glu
    2360   2365