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(54) METHOD OF TREATMENT EMPLOYING THERAPEUTIC T CELL PRODUCT FROM MOBILISED DONORS

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(57) **ABSTRACT**

The present disclosure provides a method of treating a human patient in need thereof with immune reconstitution therapy by administering a therapeutically effective amount of therapeutic T cell population selected and/or expanded from a mobilised blood sample or a mobilised apheresis sample, wherein selection is on the basis of a steady state marker and/or an activation marker optionally followed by expansion, or expansion is in the presence of antigen, such as a viral antigen. It also extends to methods of generating said therapeutic T cell populations and the product obtainable therefrom.

Figure 1. Functional profile in unpaired G-CSF mobilised (n=6) and non-mobilised (n=6) donors.

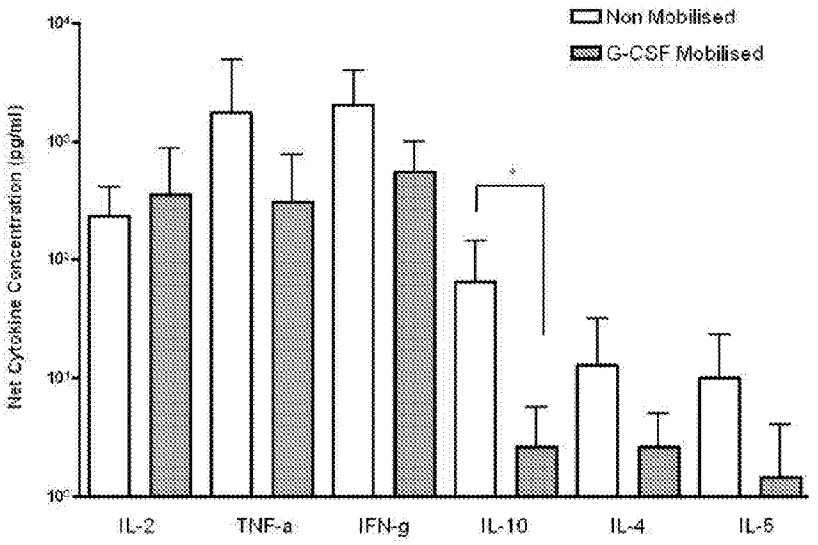


Figure 2 Identification and isolation of IFN-g secreting antigen-specific T cells in unpaired G-CSF mobilised (n=6) and non-mobilised (n=6) donors.

2A

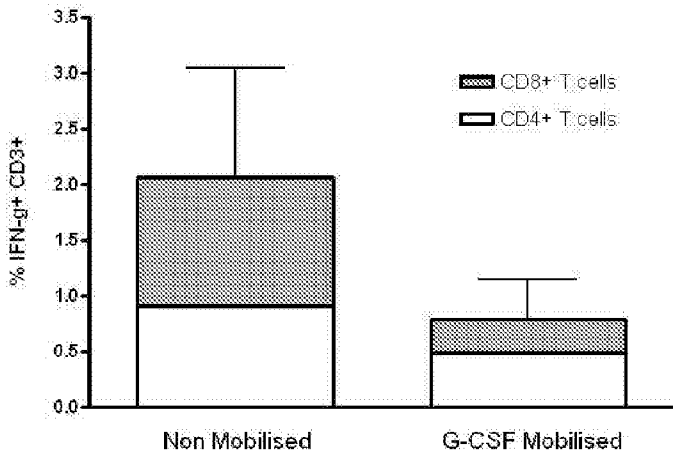


Figure 2B

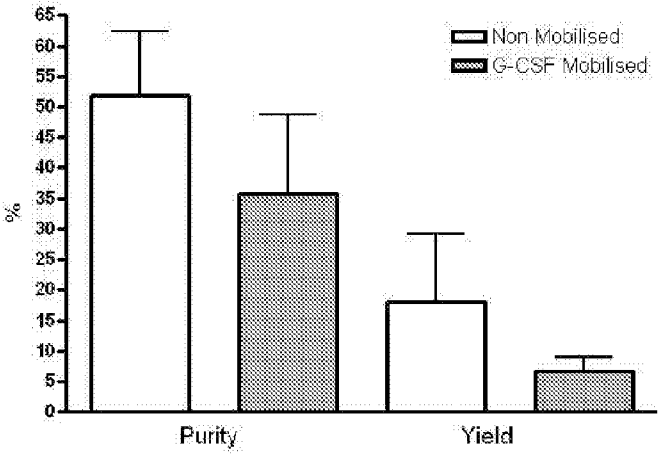


Figure 3 Optimal time of expression of activation markers in response to CMVpp65 stimulation in G-CSF mobilised (n=5) and non-mobilised (n=5) PBMC.

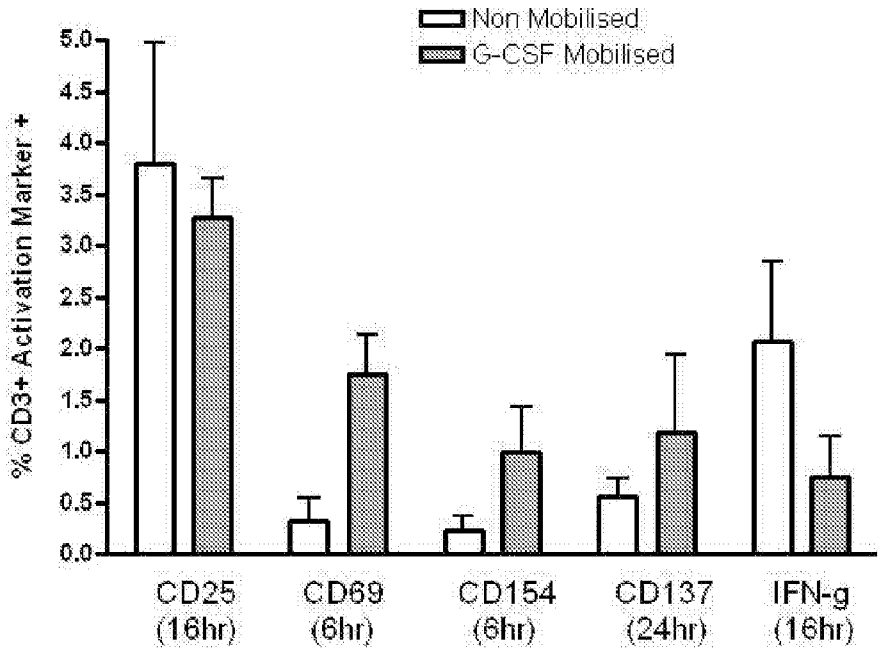


Figure 4 Direct comparison between a G-CSF mobilised and non-mobilised donor of CD154 surface expression at 4 and 6 hours.

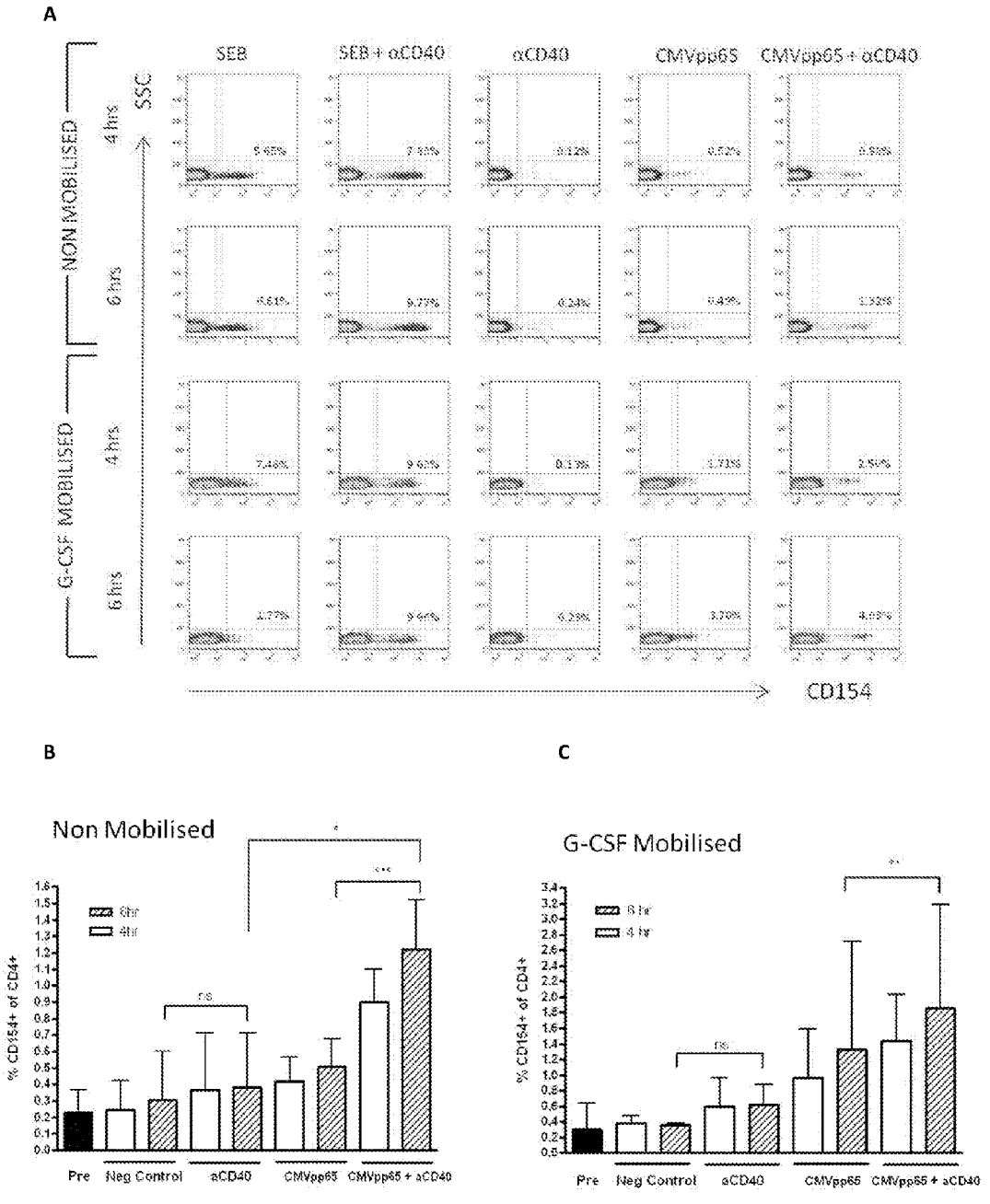
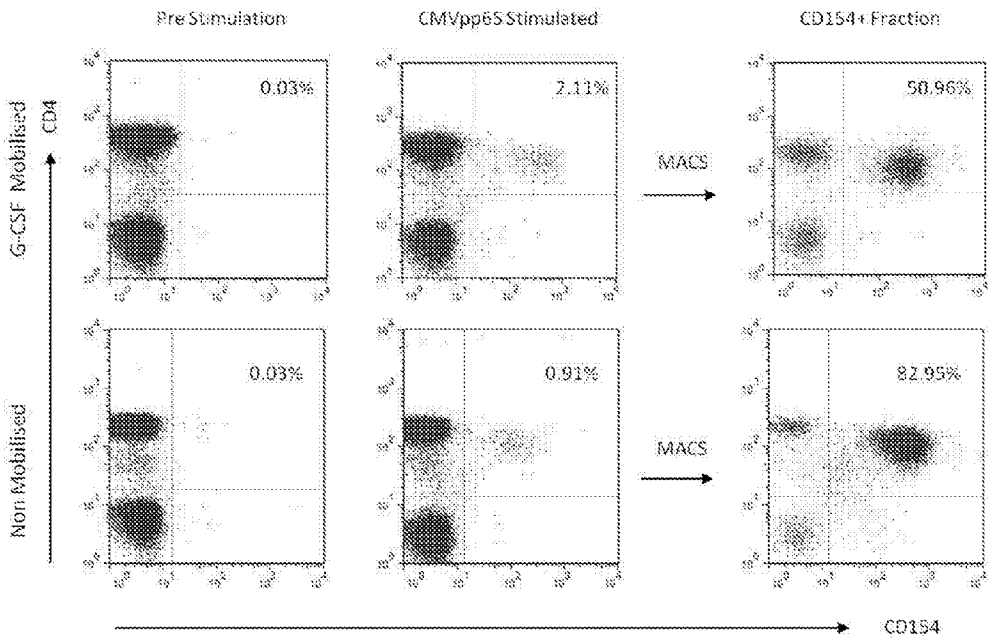


Figure 5 Isolation of CMV-specific T cells through CD154 expression in two unpaired donors.

A



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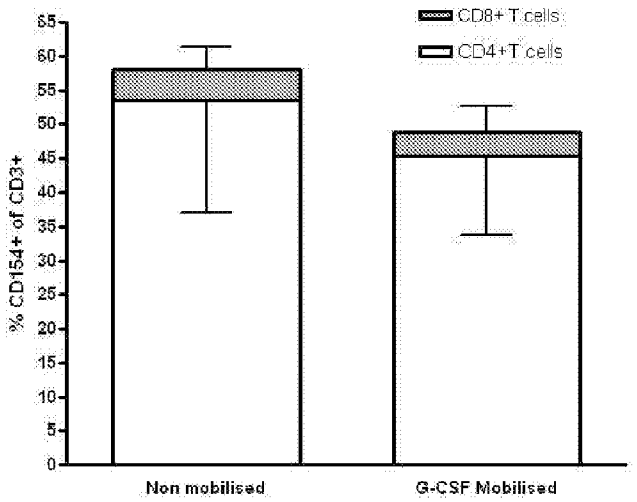
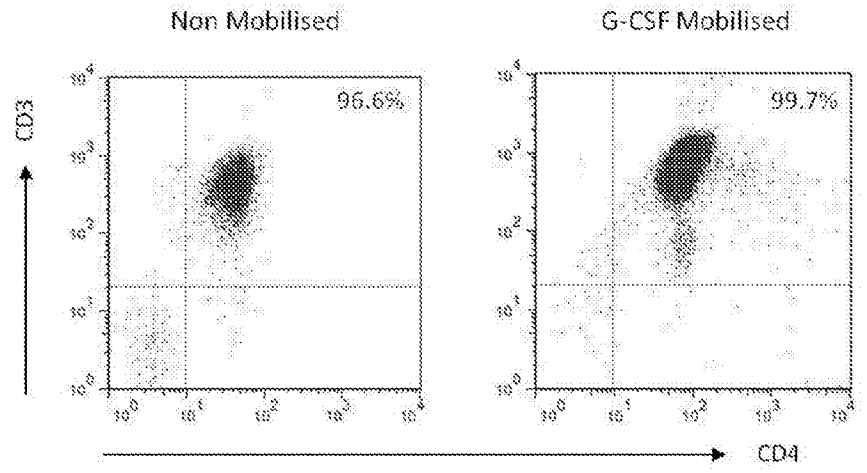


Figure 6 Re-stimulation of expanded CD154+ T cells.

A



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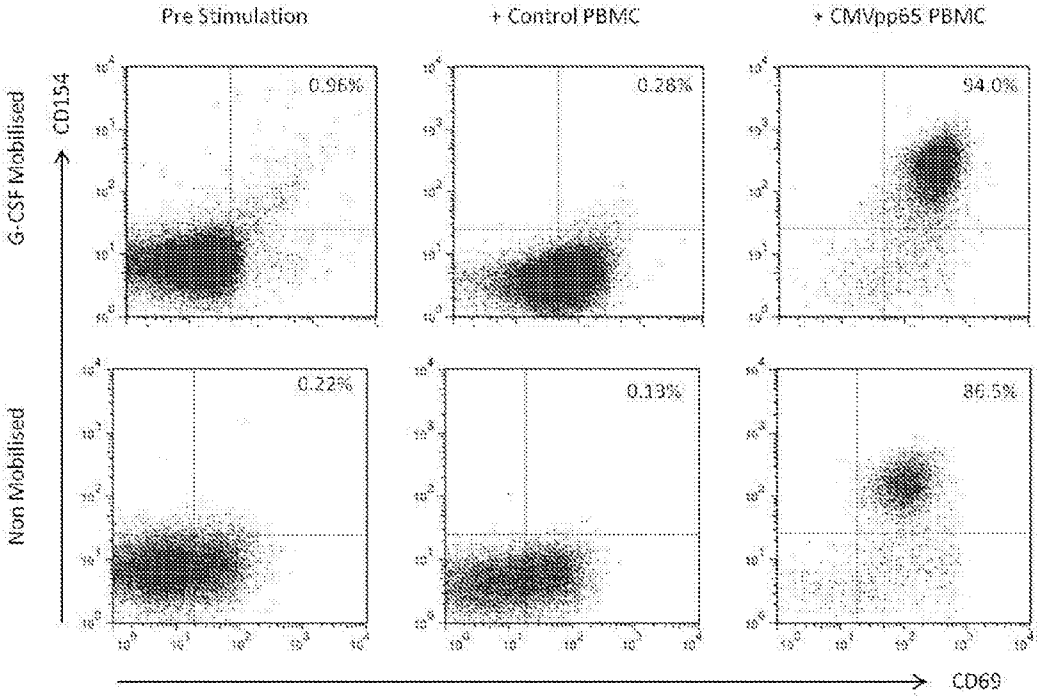
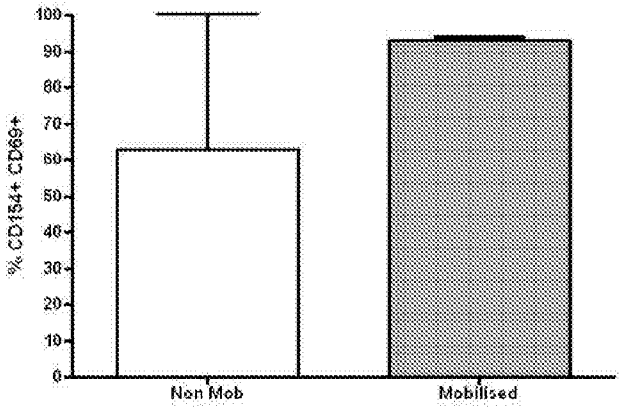


Figure 6 continued

C



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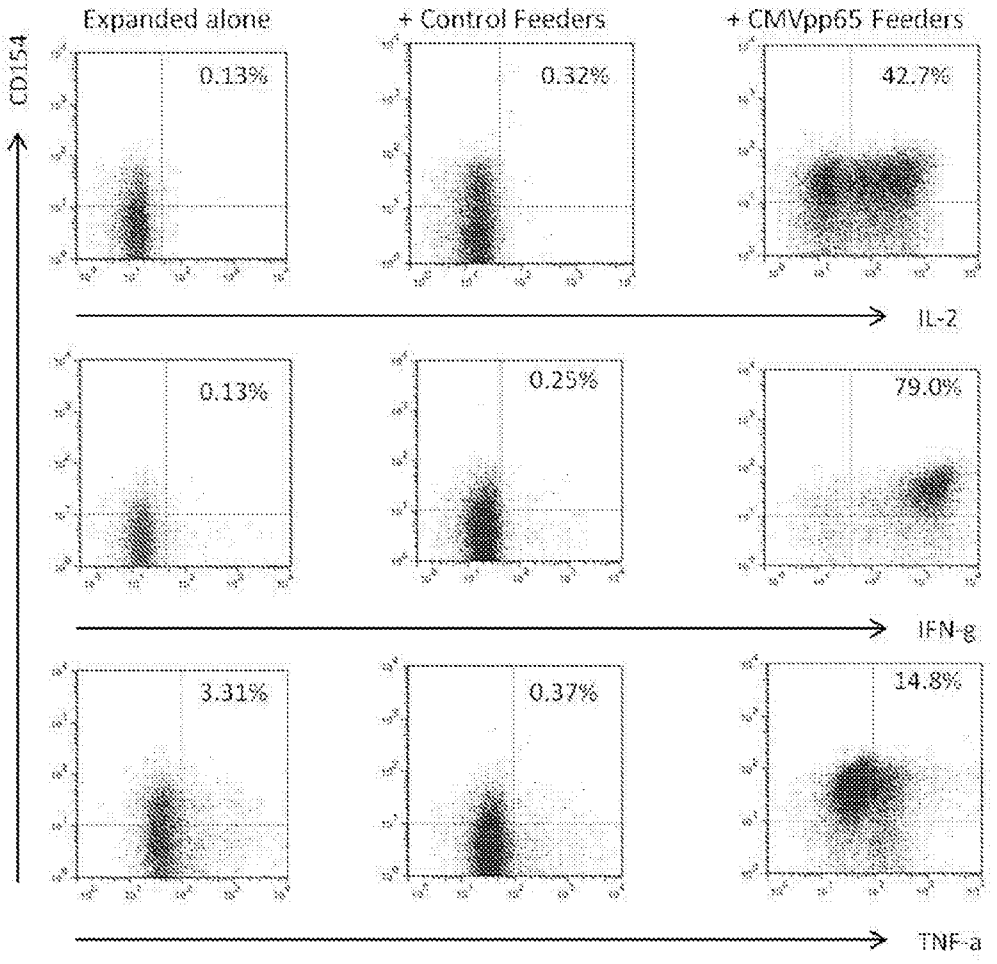


Figure 6 continued

E

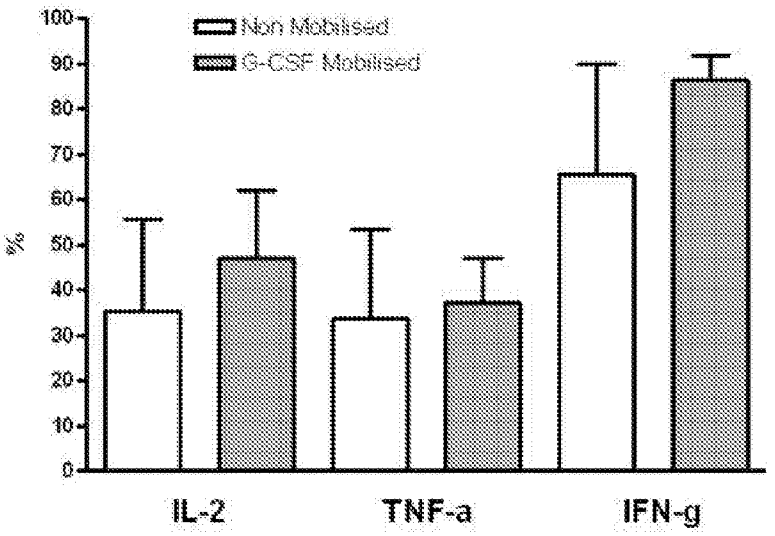
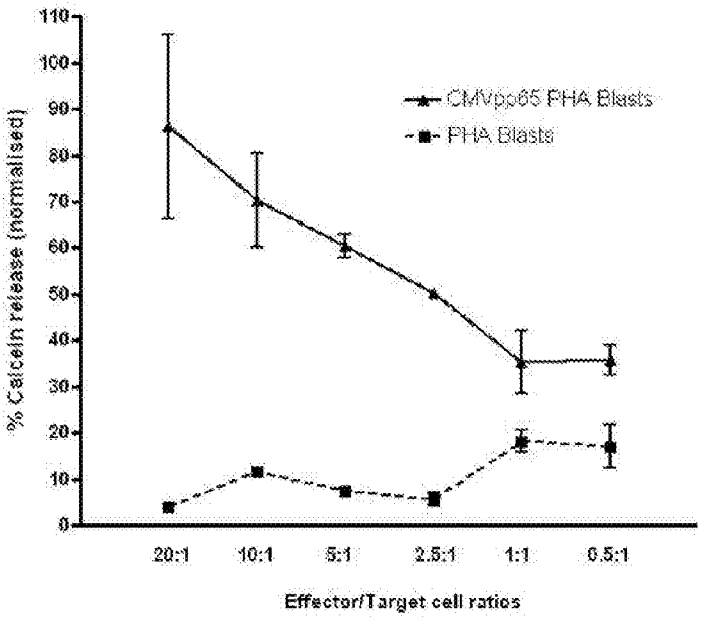


Figure 7 CD154+ CMV-specific T cells isolated from G-CSF mobilised PBMC effectively kill target cells.



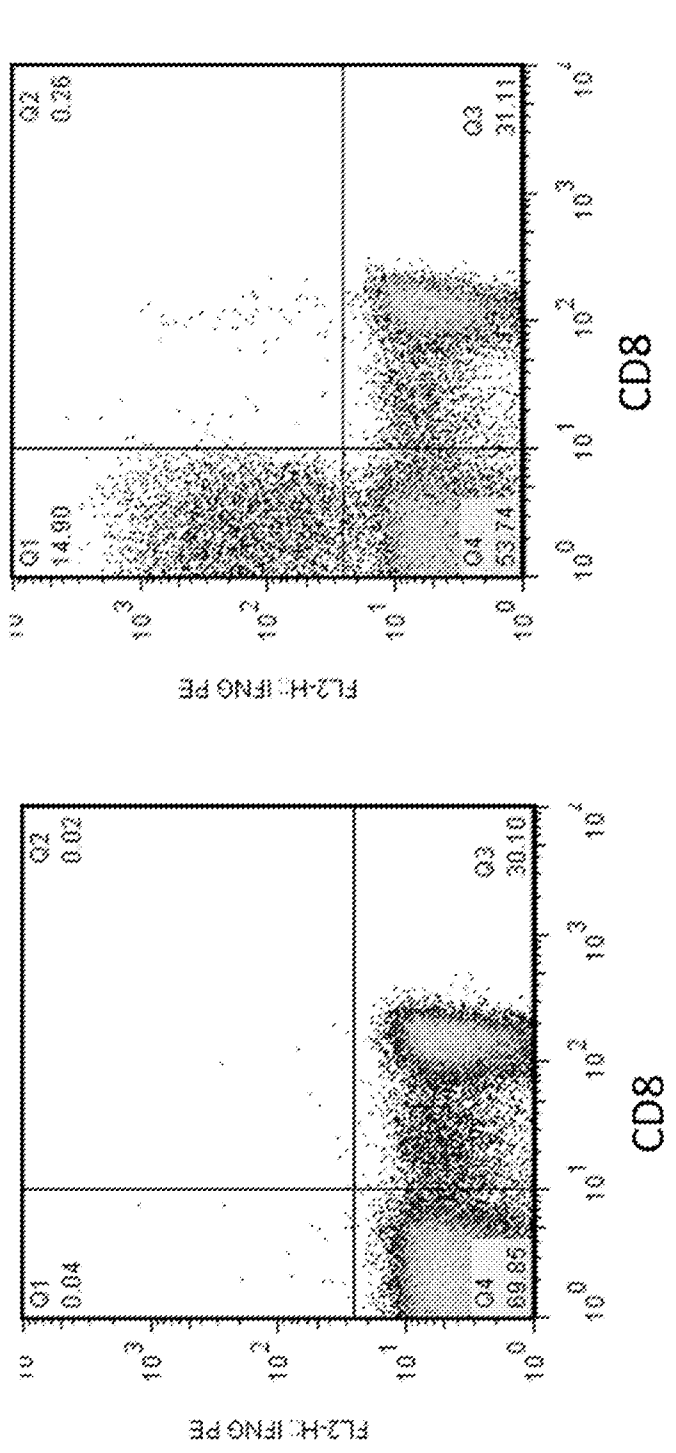
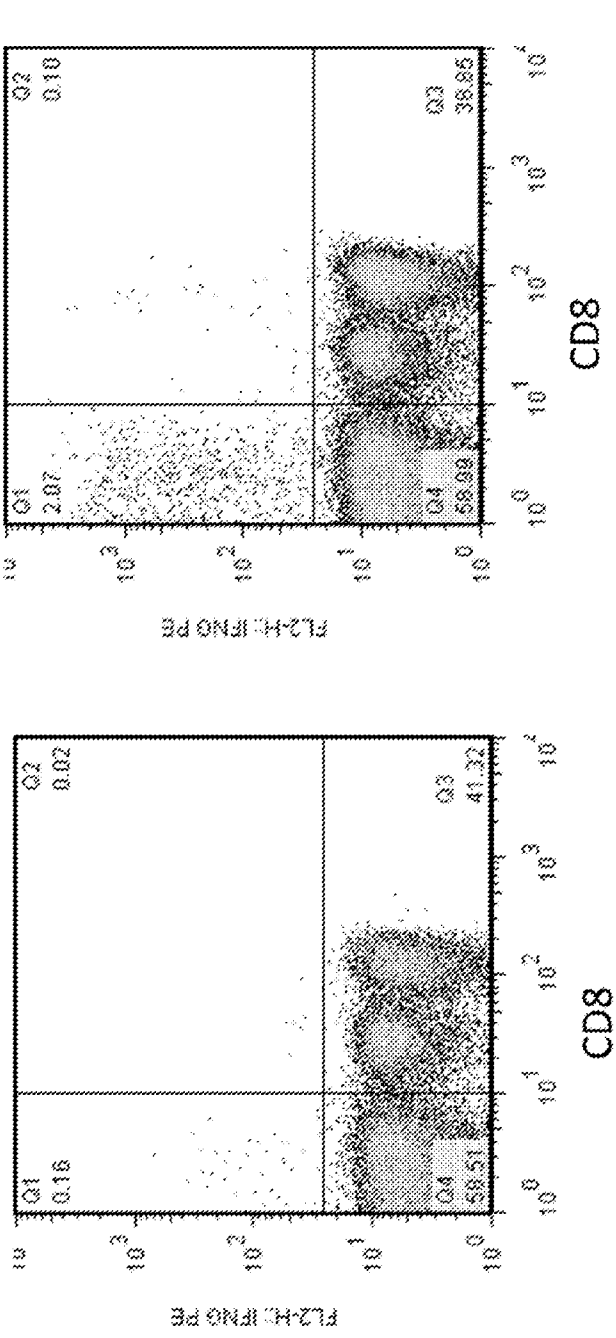


Figure 8 IFN gamma production measured by flow cytometry after 10 day expansion and restimulation with CMV pp65 peptide

Figure 9 IFN gamma production measured by flow cytometry after 10 day expansion and restimulation with Ad Hexon V peptides



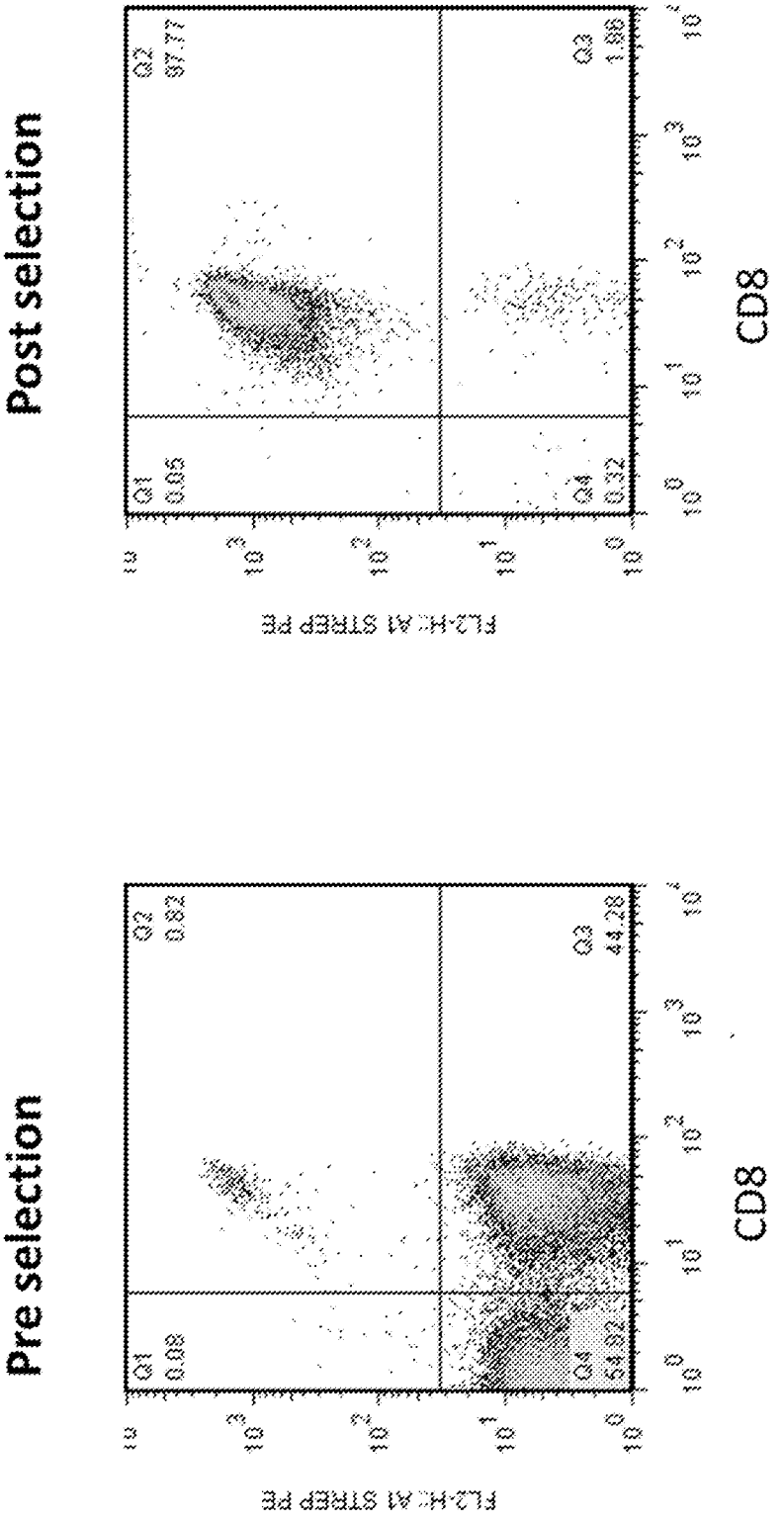


Figure 10 % of cells expressing CMV specific T cell receptors measured by flow cytometry

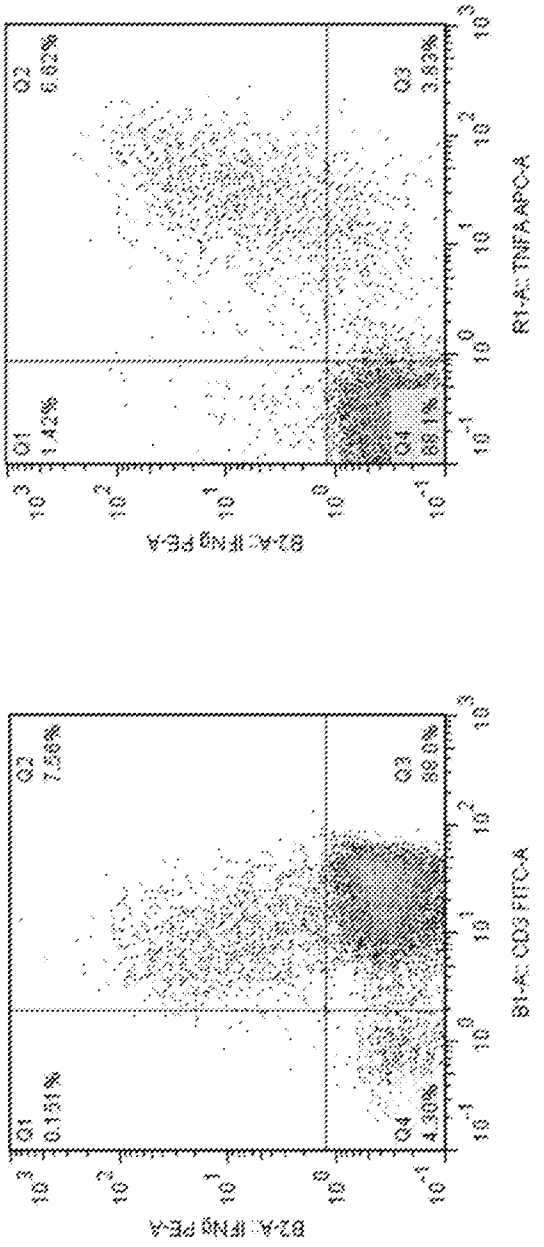


Figure 11 Cells gated on lymphocyte gate (left) or CD3 gate (right).

Figure 12

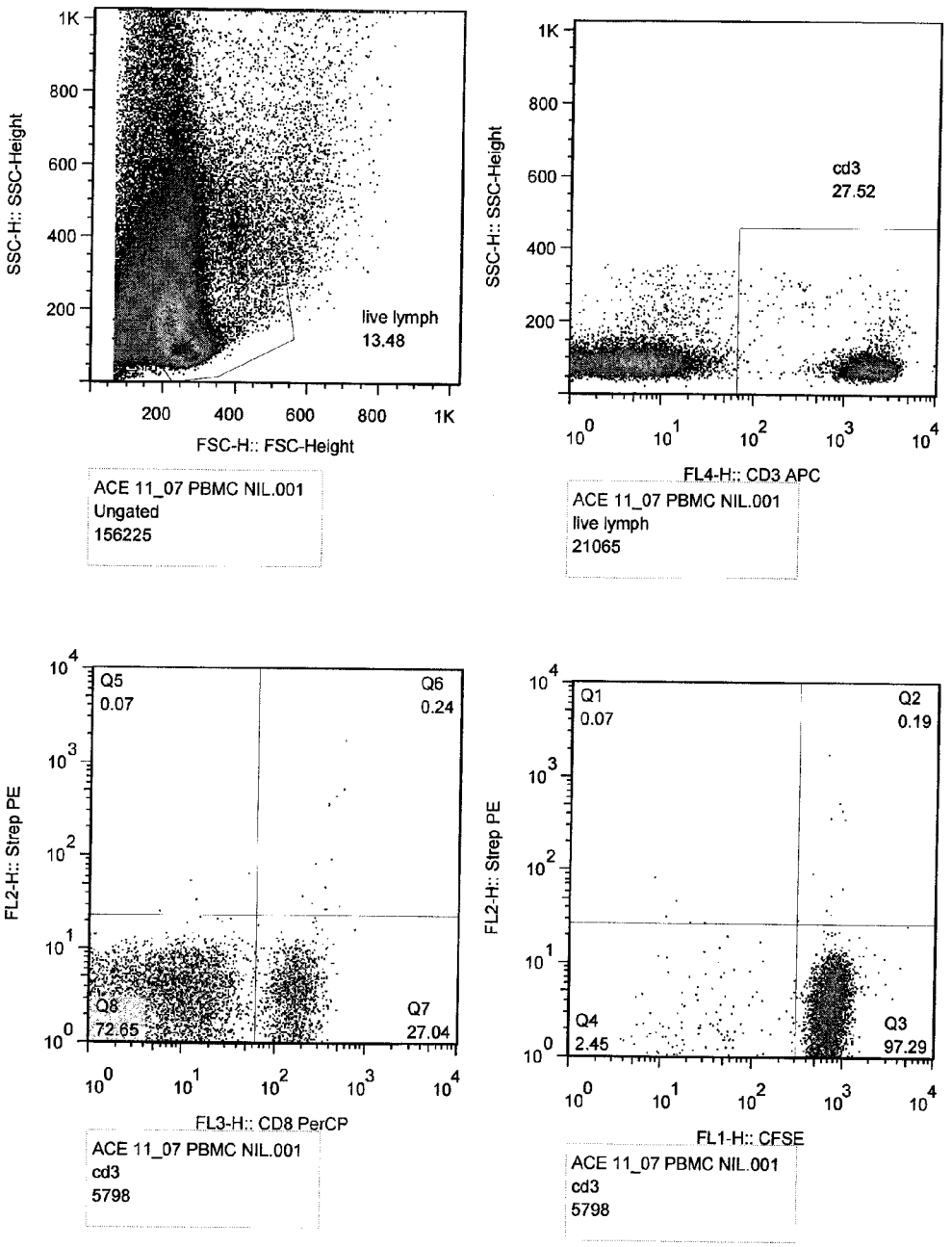
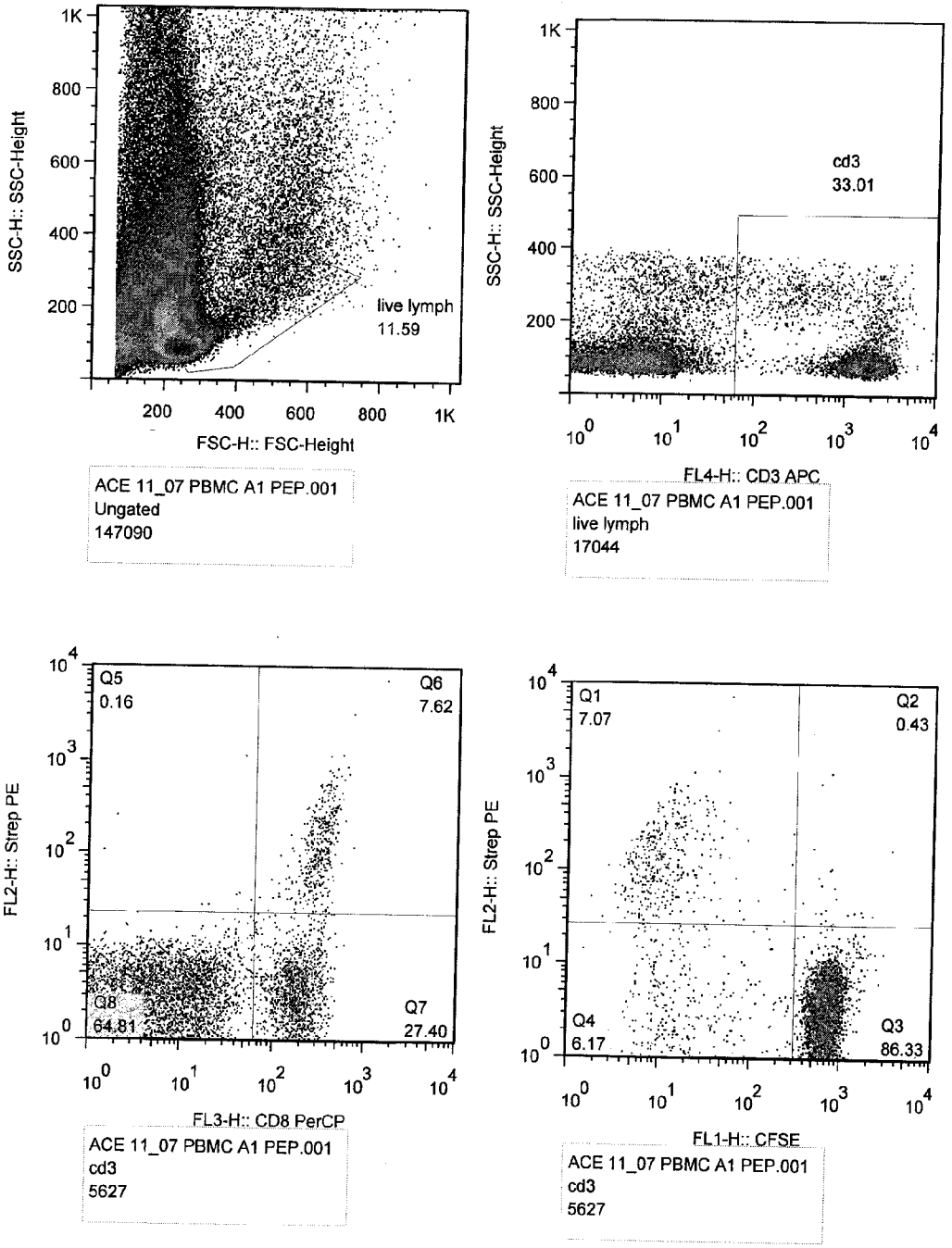

SSC-H:: SSC-Height
FSC-H:: FSC-Height
live lymph
13.48
ACE 11_07 PBMC NIL.001
Ungated
156225
SSC-H:: SSC-Height
FL4-H:: CD3 APC
cd3
27.52
ACE 11_07 PBMC NIL.001
live lymph
21065
FL2-H:: Strep PE
FL3-H:: CD8 PerCP
Q5
0.07
Q6
0.24
Q8
72.65
Q7
27.04
ACE 11_07 PBMC NIL.001
cd3
5798
FL2-H:: Strep PE
FL1-H:: CFSE
Q1
0.07
Q2
0.19
Q4
2.45
Q3
97.29
ACE 11_07 PBMC NIL.001
cd3
5798

Figure 13


SSC-H:: SSC-Height
FSC-H:: FSC-Height
live lymph
11.59
ACE 11_07 PBMC A1 PEP.001
Ungated
147090
cd3
33.01
FL4-H:: CD3 APC
ACE 11_07 PBMC A1 PEP.001
live lymph
17044
FL2-H:: Strep PE
Q5
0.16
Q6
7.62
Q8
64.81
Q7
27.40
FL3-H:: CD8 PerCP
ACE 11_07 PBMC A1 PEP.001
cd3
5627
Q1
7.07
Q2
0.43
Q4
6.17
Q3
86.33
FL1-H:: CFSE
ACE 11_07 PBMC A1 PEP.001
cd3
5627

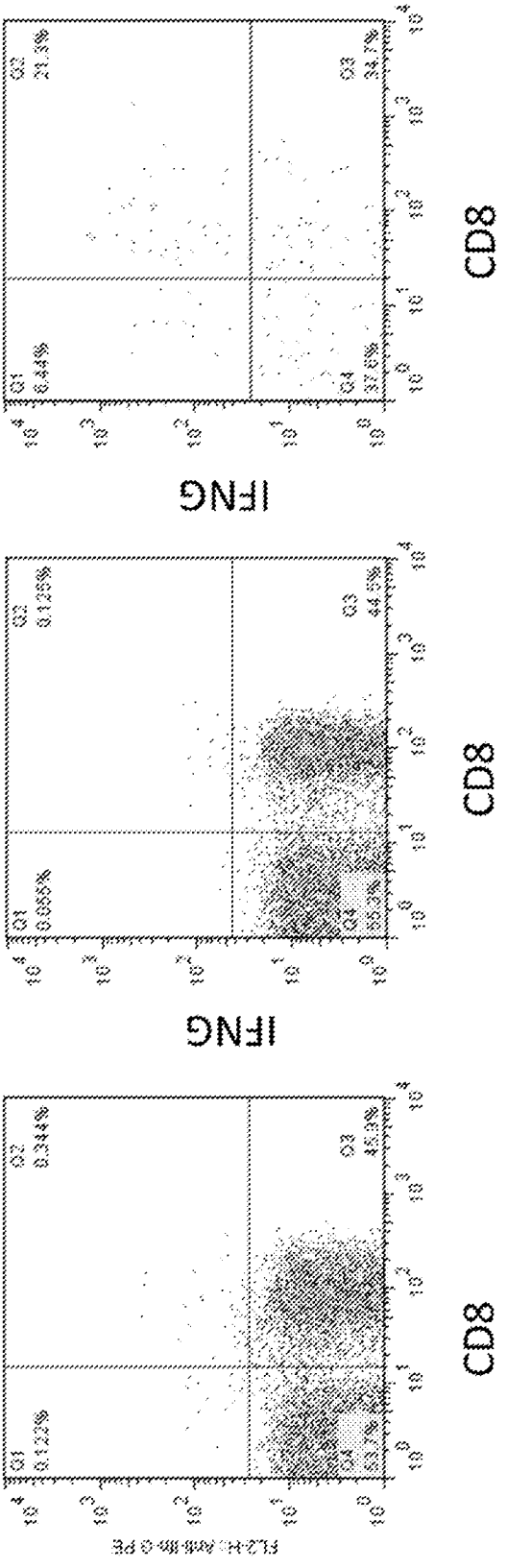


Figure 14

METHOD OF TREATMENT EMPLOYING THERAPEUTIC T CELL PRODUCT FROM MOBILISED DONORS

[0001] The present disclosure relates to methods for preparing a T cell immunotherapy product from a mobilised blood sample, for example for immune reconstitution, the T cell population obtained from the said method and pharmaceutical formulations comprising same. The disclosure also provides the T cell population and said pharmaceutical formulation for use in therapy, particularly immune reconstitution therapy, for example in the treatment or prophylaxis of viral infections such as CMV and adenovirus infections.

BACKGROUND

[0002] Immune compromised patients are susceptible to opportunistic virus infection. This is a huge problem in bone marrow transplant patients because their immune cells are sometimes intentionally depleted as part of the bone marrow transplant procedure and other times rendered non-functional due to steroid treatment for Graft versus Host Disease (GvHD) which is a common complication of bone marrow transplantation. Latent viruses, such as CMV and adenoviruses, become re-activated and the body is unable to fight the infection.

[0003] A practice of immune reconstitution has developed and this involves the transplant (adoptive transfer) into the transplant patient of immune cells from a matched HLA donor, usually the same donor who provided the bone marrow or peripheral stem cell transplantation. These cells appear to engraft in the patient to provide long-term immunity to pathogens or at least interim assistance in fighting infection until the patient's own immune system is fully reconstituted through the engraftment of the donor's haematopoietic stem cells which will then develop into a diverse array of blood cells and immune cells.

[0004] Years of clinical research into the adoptive transfer of donor immune cells to achieve immune reconstitution in a patient following a bone marrow transplant has illustrated the benefits of this approach as well as the challenges of optimising the approach to ensure a consistently efficacious and safe result. In some cases, the number of donor immune cells which are necessary to effect immune reconstitution against a specific pathogen cannot be obtained through simple mechanical selection systems. In such cases, the minimum dosing of the therapeutic immune cells, in particular antigen-specific T cells which demonstrate an adaptive memory immune response against the target pathogen, can be obtained by expanding the desired donor T cell population on an ex vivo basis using a cell culture system. Prior art indicates that the process of expansion of the cells from the donor sample generally takes about 21 days and the focus has been to expand the specific cells in order to obtain the highest number possible number (yield) of the relevant cell populations as well as the highest possible purity of the relevant cell populations, for example to obtain a population which is as close to 100 percent of the desired cells as possible.

[0005] The starting population of cells is obtained from a donor derived blood sample or dedicated apheresis product. The current practice is that the apheresis product is harvested in a dedicated apheresis when the donor has not undergone GCSF treatment and therefore is not a mobilised blood sample, for reasons discussed below.

[0006] Mobilisation by recombinant human granulocyte-colony stimulating factor (G-CSF) is used to increase the number of donor stem cells in circulation prior to donation. This allows peripheral blood stem cell plant transplantation as opposed to bone marrow transplantation. Peripheral blood stem cell transplantation has a number of advantages over bone marrow transplantation.

[0007] The current practice is that after a stem cell transplantation from the donor to the patient and the donor is then required to return at a future point in time, when the effects of the mobilisation have subsided, to provide a further unmobilised blood sample or apheresis which can be used to generate a therapeutic T cell product to augment the patient's immune responses. The T cell product may be selected from a subset of cells from the sample and/or be expanded from a fraction of a blood or apheresis sample.

[0008] Having to return for a second procedure is very inconvenient for donors and can result in non-compliance which means that sometimes a blood sample or leukapheresis is not available for generating an expanded T cell product to augment the patient's immune responses.

[0009] Currently mobilised blood is not used to generate an expanded T cell product because early work established that mobilised blood does not have the same properties as non-mobilised blood and in particular that there may be reduced activity in T cells in mobilised blood, for example Mielcarek et al in Blood, Mar. 1, 1997 vol. 89 no. 5 1629-1634 describe the suppression of alloantigen-induced T-cell proliferation by $CD14^+$ cells derived from granulocyte colony-stimulating factor—mobilised peripheral blood mononuclear cells.

[0010] In short after G-CSF stimulation in vivo, human and murine T cells show a reduced cytotoxic activity. A reduced proliferative response is also observed upon in vitro stimulation.

[0011] Reyes et al in the British Journal of Cancer (1999) 80 (1/2), 229-235 describes how granulocyte colony-stimulating factor (G-CSF) transiently suppresses mitogen-stimulated T-cell proliferative response.

[0012] Murine and human studies have suggested that G-CSF mobilization inhibits type 1 cytokine production by T cells, through inhibition of secretion as a single cell level as well as reducing the fraction of cytokine-secreting cells in the periphery; arguing against the use of these cells in adoptive immunotherapy (Pan et al 1999, Arpinati et al 200 and Tayebi et al 2001).

[0013] This reduced functionality of certain cells from mobilised-blood was confirmed by a number of authors see for example Joshi et al—Decreased immune functions of blood cells following mobilization with granulocyte colony-stimulating factor: association with donor characteristics Blood, 15 Sep. 2001 Vol 98, No 6, 1963-1970, and Nawa et al G-CSF reduces IFN-γ and IL-4 production by T cells after allogeneic stimulation by indirectly modulating monocyte function, Bone Marrow Transplantation (2000) 25, 1035-1040.

[0014] G-CSF was also considered to have a role in immune tolerance, see for example Anke Franzke's review in Cytokine & Growth Factor Reviews 17 (2006) 235-244 entitled the role of G-CSF in adaptive immunity and Rutella et al granulocyte colony-stimulating factor: a novel mediator of T cell tolerance, The Journal of Immunology 2005 7085-7097. Whist immune tolerance to transplanted cells is desirable general immune tolerance is not desirable when generating a therapeutic T cell product for augmenting a patient's

immune response. In fact tolerance may have some links with T cell anergy or hyporesponsiveness.

[0015] Other research has suggested that G-CSF may skew the T cell population to the Th2 group, which may be less effective in controlling an intracellular viral infection.

[0016] Thus the practice in the field is to not employ mobilised-blood for the preparation of expanded T cell products.

[0017] The present inventors believe that whilst in vitro T cells from mobilised blood appear less able to secret interferon-gamma (an activation marker for antigen-stimulated T cells) as per FIG. **6** the cells nevertheless are suitable for use as T cell therapeutic product. This observation is somewhat counter-intuitive because interferon-gamma is a pro-inflammatory cytokine involved in immune responses and a skilled person would naturally consider that lower levels of secretion of this cytokine was indicative of generally lower activity of the T cell from mobilised blood. However, it is possible to select and expand antigen specific T cells from mobilised blood and once taken out of the mobilised cell environment these cells are not inferior in function to T cells from non-mobilised blood.

[0018] Surprisingly, the present inventors have established that in fact therapeutic T cell products selected and/or expanded from G-CSF mobilised blood or mobilised apheresis are safe and effective when administered in vivo to a post-haematopoietic stem cell transplant patient.

SUMMARY OF INVENTION

[0019] In one embodiment there is provided a method of treating patient in need thereof with immune reconstitution therapy by administering a therapeutically effective amount of a therapeutic T cell population selected and/or expanded from a G-CSF mobilised blood sample or mobilised apheresis, in particular where the patient is post-haematopoietic stem cell transplantation.

[0020] The present disclosure also provides a therapeutic T cell population selected and/or expanded from a G-CSF mobilised blood sample or for use in treatment, in particular the treatment of a post-haematopoietic stem cell transplant patient.

[0021] In one embodiment the therapeutic T cell population is an antigen-specific T cell population.

[0022] In one embodiment the antigen-specific T cell population is specific for a virus for example selected from the group comprising cytomegalovirus, adenovirus, varicella zoster virus, human papillomavirus, hepatitis B virus, hepatitis C virus, BK virus, Epstein-Barr virus, Kaposi's sarcoma-associated herpes virus and human T-lymphotropic virus, such as cytomegalovirus or adenovirus.

[0023] In one embodiment the virus is cytomegalovirus.

[0024] In one embodiment the therapeutic T cell population is suitable for treating virus infection, in particular a specific virus infection described herein or a combination of the same.

[0025] In one embodiment the T cells are allogeneic i.e. derived from a HLA matched donor, in particular a fully matched donor.

[0026] In one embodiment the T cell population is selected on the basis of a steady state marker, for example the T cell receptors (TCR).

[0027] In one embodiment the T cell population is selected on the basis of a marker for example a marker that is independently selected from CD25, CD69, CD137, and CD154 and a combination thereof, for example CD69, CD137, and CD154 and a combination thereof, such as CD154.

[0028] After selection the cell population may be expanded to increase the dose of cells available for the patient.

[0029] Alternatively, a starting population of cells may be expanded in the presence of antigen. This process involved a natural selection element in that the process specifically cultivates cells specific to the antigen and non-target cell populations are reduced or eliminated.

[0030] In one embodiment the population of T cells does not comprise significant amounts of the cell surface marker CD25.

[0031] In one embodiment the therapeutic T cell product is selected from a G-CSF mobilised apheresis.

[0032] In one embodiment the therapeutic T cell product is expanded from a G-CSF mobilised blood sample.

[0033] Cells derived from mobilised sample may show reduced levels of interferon-gamma secretion in vitro. Nevertheless the inventors have evidence to suggest that these cells are functioning and are suitable for use in the therapeutic product despite in vitro property. This generates a practical difficulty in relation to the selection of the relevant populations because selections of the relevant T cell populations based on methods such as gamma-capture are sub-optimal. Therefore, if selection is to be employed a steady state T cell marker and/or an activation marker has to be employed. In one embodiment this employs a stimulation step followed by selection on a cell surface marker such as CD154, in another embodiment this employs a direct selection method such as one based on the T cell receptor-streptamer selection.

[0034] Thus in fact mobilised-blood is a suitable starting material for the preparation of T cell products and also provided is a method of selecting and/or expanding a target T cell population which is specific to a virus from a starting T cells population from a mobilised blood sample wherein selection employs direct selection targeting a steady state maker on the surface of the T cells and expansion employs conditions suitable for expansion of target virus specific T cell population.

[0035] Given the negative disclosures in relation to the use of mobilised-blood samples for the preparation of T cell products, it is very surprising that the material can in fact be employed successfully. Additionally the methods according to the present disclosure provide a huge advantage to donors, patients and healthcare workers because use of mobilised blood samples ensures the expanded T cell therapy will be available to more patients without the inconvenience and disadvantages caused to donors by the prior art methods.

[0036] There are also significant resource savings associated with the present method because the collection, transport and storage of a second sample requires a significant amount of additional human and financial resources.

[0037] Furthermore, being able provide an immunotherapy with T cells from mobilised blood may have the further advantage that the therapeutic product can be prepared immediately after the donation thereby avoiding the "lag-time" associated with obtaining an unmobilised sample and then processing the same to provide a therapeutic product.

[0038] Finally the donor has not to undergo an additional medical intervention and is therefore not put at the risks associated with an additional leukapheresis procedure.

BRIEF DESCRIPTION OF THE FIGURES

[0039] FIG. **1** Functional profile in unpaired G-CSF mobilised (n=6) and non-mobilised (n=6) donors Quantitative assessment of IL-2, TNF, IFN-γ, IL-10, IL-4 and IL-5 in the supernatant of cultures after 16 hour CMVpp65 stimulation.

Concentration of cytokine is expressed as a net value after subtraction of the negative control (unstimulated).

[0040] FIG. **2** Identification and isolation of IFN-g secreting antigen-specific T cells in unpaired G-CSF mobilised (n=6) and non-mobilised (n=6) donors. (**2**A) PBMC were stimulated for 16 hours with CMVpp65 and the frequency of IFN-γ secreting cells analysed amongst CD3+ T cells. (**2**B) IFN-γ secreting cells were isolated using magnetic cell sorting and purity and yield determined within the CD3+ population.

[0041] FIG. **3** Optimal time of expression of activation markers in response to CMVpp65 stimulation in G-CSF mobilised (n=5) and non-mobilised (n=5) PBMC. PBMC were stimulated over 24 hours and samples analysed for CD25, CD69 CD154 and CD137 expression at 1, 4, 6, 16 and 24 hours. IFN-γ secretion was analysed at 16 hours. Bars represent net expression in the CD3+ population for each activation marker at the optimal time of expression.

[0042] FIG. **4** Direct comparison between a G-CSF mobilised and non-mobilised donor of CD154 surface expression at 4 and 6 hours. (**4**A) PBMC were stimulated with either CMVpp65 Peptivator or SEB in the presence or absence of CD40-specific antibody (1 μg/ml). Cells are gated on CD3+ CD4+ T cells (**4**B, C) Comparison of CD154 expression in non-mobilised (n=5) and G-CSF mobilised (n=5) donors. Data are presented as means with standard deviation (SD)

[0043] FIG. **5** Isolation of CMV-specific T cells through CD154 expression in two unpaired donors. (**4**A) PBMC from non-mobilised and G-CSF mobilised donors were stimulated with CMVpp65 Peptivator for 6 hours in the presence of CD40-specific antibody. Cells were stained for CD154 amongst CD3+ lymphocytes before stimulation after stimulation and after sorting of CD154+ T cells on the MiniMACS. (B) Positive fractions from CD154+ sorts after CMVpp65 stimulation in G-CSF mobilised (n=4) and non-mobilised (n=4) PBMC. Data are presented as means with SD.

[0044] FIG. **6** Re-stimulation of expanded CD154+ T cells. (A) Expanded CD154+ T cells stained for CD3 and CD4 before re-stimulation after 21 days in culture. (B) Expanded CD154+ were co-cultured with autologous PBMC with or without CMVpp65 for 6 hours in the presence of CD40-specific antibody. After stimulation we analysed expression of CD154 versus CD69. (C) CD154+ expanded cells from G-CSF mobilised (n=3) and non-mobilised (n=3) PBMC analysed for CD154, CD69 (D) Expanded CD154+ from G-CSF mobilised PBMC were stimulated as described in the presence of Brefeldin A and CD28-specific antibody. Cells were fixed and permeabilised and analysed for expression of CD154 versus IL-2, TNF and IFN-γ. (E) Analysis of IL-2, IFN-γ, and TNF expression after re-stimulation with autologous CMVpp65 PBMC in G-CSF mobilised (n=3) and non-mobilised (n=3) PBMC. Data are presented as means with SD.

[0045] FIG. **7** CD154+ CMV-specific T cells isolated from G-CSF mobilised PBMC effectively kill target cells. Specific lysis of autologous PHA blasts loaded with CMVpp65 peptides at E:T ratios from 50:1 to 0.5:1 determined using fluorescent dye Calcein-AM cytotoxicity assay.

[0046] FIG. **8** A sample of mobilised apheresis product was expanded for 10 days using a rapid expansion process—employing the G-rex40 culture device and IL-4 and IL-7. Cells were then re-stimulated with media alone (un-stimulated) or with CMV pp65 peptides. The amount of IFN gamma production was measured by flow cytometry. Cells are gated on live lymphocytes and CD3. This plots shows in Q1 that the desired population of expanded cells from mobilised blood are capable of secreting interferon-gamma. The skilled person will know that the profile exhibited in this plot is comparable to the profile obtained under the same conditions for cells expanded from non-mobilised blood.

[0047] FIG. **9** A sample of mobilised apheresis product was expanded for 10 days using a rapid expansion process—employing the G-rex40 culture device and IL-4 and IL-7. Cells were then re-stimulated with media alone (un-stimulated) or with ADV Hexon V peptides. The amount of IFN gamma production was measured by flow cytometry. Cells are gated on live lymphocytes and CD3. This plots shows in Q1 that the desired population of expanded cells from mobilised blood are capable of secreting interferon-gamma. The skilled person will know that the profile exhibited in this plot is comparable to the profile obtained under the same conditions for cells expanded from non-mobilised blood.

[0048] FIG. **10** A sample of mobilised apheresis product was taken from the stem cell harvest and sent to Cell Medica for processing. The cells were exposed to the specific streptamer selection reagent and selected using the CliniMACS. This was then dosed at 3×10e4 T cells per Kg for administration to the patient. The percentage of cells expressing the CMV specific T cell receptor (streptamer positive) was measured by flow cytometry. This shows that T cells can be successfully derived from mobilised apheresis samples in doses and purity equivalent to non-mobilised products and can be administered to patients safely.

[0049] FIG. **11** Shows cells from FIG. **10** were gated on live lymphocytes and CD3.

[0050] FIGS. **12** & **13** Show that antigen specific T cells are functional even when derived from an original sample which is mobilised

[0051] FIG. **14** Shows analysis of a sample therapeutic T cells selected by gamma-capture used to treat a patient with refractory CMV infection and the starting material from which it was derived

DETAILED DESCRIPTION

[0052] Mobilised blood as employed herein refers to a blood sample from a donor who has been mobilised by treatment with agent such as G-CSF. The process of mobilisation increases the number of stems cells in the peripheral blood.

[0053] Apheresis as employed herein is the product of the process where the blood of a donor is passed through an instrument that separates out one of more particular components from the blood and returns the remainder back into the donor's circulation.

[0054] Apheresis is employed to generate the leukapheresis employed in stem cell transplantation.

[0055] In preparation for the stem cell transplantation the leukapheresis product may undergo a selection for CD34+ stem cells. A bi-product is obtained from this process known as the $CD34^-$ fraction. Advantageously, the present process can employ this bi-product to selected or expand the therapeutic T cell population from. In one embodiment the apheresis is a CD34− fraction.

[0056] Apheresis is also advantageous in that it potentially gives access to a large number of cells in the starting material, for example in the region of 1 to 10 billion cells, such as 2, 3, 4, 5, 6, 7, 8 or 9 billion cells. This number of cells is sufficient to generate a suitable therapeutic dose of T cell by selection only, i.e. without the requirement for subsequent expansion.

[0057] In contrast a blood sample may only contain in the region of 20 million cells. Therefore if the starting material is a blood sample or a sample containing relatively low number of cells then an expansion step will generally be required generate a suitable therapeutic dose of cells for the patient.

[0058] Mobilised apheresis as employed herein refers to a sample from a donor who has been mobilised by treatment with agent such as G-CSF. The process of mobilisation increases the number of stems cells in the peripheral blood.

[0059] There are various permutations of the present process and these are summarised below:

[0060] 1. Direct selection based on a steady state marker, such as the TCR marker, to give a therapeutic dose (starting material an apheresis),

[0061] 2. Selection based on an activation marker, such as described herein, to give a therapeutic dose (starting material an apheresis),

[0062] 3. Direct selection based on a steady state marker, followed by expansion to give a therapeutic dose (starting material blood or apheresis)

[0063] 4. Selection based on an activation marker, followed by expansion to give a therapeutic dose,

[0064] 5. Expansion in the presence of antigen to generate a therapeutic dose of an antigen specific T cell population (starting material blood or apheresis).

[0065] Immune reconstitution as employed herein is intended to refer to providing the host with a mechanism for generating an immune response or augment the host's immune response to approximate that in a healthy individual where otherwise the host's response would be minimal or non-existent due to an impairment

[0066] In one embodiment the haematopoietic stem cell transplantation is allogeneic haematopoietic stem cell transplantation (allo-HSCT) including procedures involving stem cell donation from related or unrelated donors or from cord blood, such as peripheral stem cell transplantation unless the context indicates otherwise.

[0067] Effective in treatment as employed herein refers to a therapy that is safe for administration to patients and is at least broadly comparable to prior art T cell therapies derived from non-mobilised blood.

[0068] Therapy in the context of the present disclosure includes prophylactic therapy, which in the context of immune reconstitution is standard practice.

[0069] "T cell" is a term commonly employed in the art and intended to include all CD3+ cells including thymocytes, immature T lymphocytes, mature T lymphocytes, resting T lymphocytes or activated T lymphocytes. A T cell can be a T helper (Th) cell, for example a T helper 1 (Th1) or a T helper 2 (Th2) cell, although other grouping of T cell populations are being discovered based on intensive research. The T cell can be a CD4+ T cell, CD8+ T cell, CD4+CD8+ T cell, CD4-CD8− T cell or any other subset of T cells.

[0070] T cell product as employed herein refers to a population of T cells suitable for use in therapy, for example immune reconstitution therapy.

[0071] Expanding a target T cell population as employed herein is intended to refer to increasing the number of the target cells in a population of cells as a result of cell division, for example by culturing a starting population of cells in a suitable medium.

[0072] T cell expansion may be evaluated by counting viable CD3+ cells (i.e. the target population of cells).

[0073] Viable cells can be tested by cell staining with Trypan blue (and light microscopy) or 7-amino-actinomycin D, vital dye emitting at 670 nm (or ViaProbe a commercial ready-to-use solution of 7AAD) and flow cytometry, employing a technique known to those skilled in the art. Where the stain penetrates into the cells the cells are considered not viable. Cells which do not take up dye are considered viable. An exemplary method may employ about 5 μL of 7AAD and about 5 μL of Annexin-V (a phospholipid-binding protein which binds to external phospholipid phosphatidylserine exposed during apotosis) per approximate 100 μL of cells suspension. This mixture may be incubated at ambient temperature for about 15 minutes the absence of light. The analysis may then be performed employing flow cytometry. See for example M G Wing, A M P Montgomery, S. Songsivilai and J V Watson. An Improved Method for the Detection of Cell Surface Antigens in Samples of Low Viability using Flow Cytometry. J Immunol Methods 126: 21-27 1990.

[0074] An alternative stain is TO-PRO-3 which is a carbocyanine monomer nucleic acid stain with far-red fluorescence similar to Alexa Fluor 647 or Cy 5 dyes. It is useful as a nuclear counterstain and dead cell indicator, and is among the highest-sensitivity probes for nucleic acid detection.

[0075] In one embodiment the T cell population is selected from mobilised blood by direct selection based on a steady state marker, such as the T cell receptor (TCR). This process employs HLA: peptide complexes particularly in the form of multimers, such as tetra, penta and/or hexamers which ligate to T cell receptor. These peptides are labelled, for example with a fluorescent label or a magnetic bead which allows then to them to be identified and selected. In one embodiment a magnetic label is employed.

[0076] Thus direct selection generally involves the clinical grade enrichment of lymphocytes from a fraction of mobilised apheresis product. This may use a dedicated device such as a Sepax device from Biosafe. The resulting lymphocytes are then incubated with a selection reagent which is a mulimerised MHC/peptide complex attached to a magnetic bead. Where the MHC/peptide complex is matched to the patient and donor and is specific for an antigen specific T cell receptor. Following incubation the cells are washed and the bound cells are selected with a device such as the Miltenyi CliniMACS or any other technology that enables cell selection using magnetic beads where positive cells are retained on a magnetic column or in a bag and the negative cells are washed off. The magnet is then removed and the antigen specific cells are eluted

[0077] In one embodiment the multimers are Streptamers. The ligation of the TCR by Streptamers is reversible and after selection of the desired population of cells then treatment with a specific reagent results is removal of the complexes from the cells.

[0078] HLA complexes employed need to be matched with the HLA type so that they can ligate a virus specific population of T cells, such that the peptides or multimers are of a specific HLA-type, for example A1, A2, B7, A24, B35, such as A0201 and B0702.

[0079] Selection can also or alternatively be based on activation markers. These are makers which are upregulated as a consequence of antigen stimulation. A plethora of these exist and are known to those skilled in the art and include makers such as CD25, CD69, CD137, CD154 and combinations thereof.

[0080] These markers can be selected by ligation with monomeric, dimeric, multimeric antibody or binding fragments thereof. These antibodies or fragments are labelled, for example with a fluorescent label or a magnetic bead which allows then to them to be identified and selected. In one embodiment a magnetic label is employed.

[0081] In one embodiment the antibody or fragment employed is a fab-streptamer, for example available from IBA GmBH Germany.

[0082] The binding of these fab-streptamers is reversible in that after selection of the desired cell population treatment with an appropriate reagent releases them from the cells.

[0083] Ligation as employed herein refers to binding.

[0084] In one embodiment the T cell population is selected from mobilised blood and then expanded.

[0085] In one embodiment selection is not required before expansion because the expansion selectively enriches for the target population of cells which is facet of the expansion process.

[0086] A T cell population specific to a virus as employed herein is intended to refer to the fact that the relevant population of cells primarily recognises and at least one viral antigen to which is specific, and for example generates an immunological response after recognition of the target virus. Specificity in this context does not necessarily mean that only the target virus is recognised, although in some instances only the target virus will be recognised, but at least the target virus is recognised with greater affinity, avidity or magnitude of response in comparison to non-target viruses.

[0087] Viral antigen as employed herein is intended to refer to those antigens specified by the viral genome (often coat proteins) that can be detected by a specific immunological response. In one embodiment the viral antigen is a surface antigen.

[0088] In one embodiment the virus is a DNA virus, for example a double stranded DNA virus.

[0089] In one embodiment the virus is an RNA virus.

[0090] Typically the PBMCs are obtained from the blood or apheresis product by Ficoll density gradient separation known to those skilled in the art.

[0091] The step of obtaining a sample from the patient can be a routine technique of taking a blood sample. This process presents little risk to patients and does not need to be performed by a doctor but can be performed by appropriately trained support staff. In one embodiment the sample derived from the patient is approximately 500 ml, 400 ml, 300 ml, 200 ml, 100 ml, 50 ml, 40 ml, 30 ml, 20 ml, 10 ml, 5 ml or less of blood.

[0092] In one embodiment the starting material is a fraction of the mobilised apheresis product that is taken once it has been ensured that the CD34+ cell dose for the patient has been achieved. For example 4×10e6 CD34+ cells per kg patient weight.

[0093] In one embodiment the cells which are bi-product of the stem transplantations are employed. Stem cells for transplantation are often selected on the basis of CD34. Those populations which are negative for CD34 are often discarded after selection. However, this deselected population is suitable for generating a therapeutic T cell product, for example employing a method described herein, such as T cell expansion.

[0094] As is known to the skilled person expansion of T cells is generally performed in a suitable T cell expansion media. T cell expansion media generally comprises serum, media and any cytokines employed in the expansion step.

[0095] In one embodiment the media is Advanced RPMI media or RPMI media 1640, available from Life Technologies.

[0096] In one embodiment the cell expansion medium comprises 10% human AB serum, 200 mM L-glutamine, and RPMI-1640.

[0097] In one embodiment the medium comprises 45% advanced RPMI, 45% EHAA, 10% FCs and 200 mM L-glutamine.

[0098] In one embodiment the cell expansion medium comprises 10% human AB serum, 200 mM L-glutamine, 45% Earle's Ham's amino acids (EHAA or Click's medium) and 45% advanced RPMI or RPMI-1640.

[0099] In one embodiment the cytokines employed are discussed below.

[0100] In one embodiment the T cell expansion medium employed is not changed or supplemented during the expansion process, especially where a rapid expansion process is employed. Rapid expansion as employed herein refers to a process in a therapeutic product is obtained within less than 18 days, such as 7-10 days.

[0101] Thus in one embodiment there is provided according to the present disclosure an in vitro expansion process for rapid expansion of antigen specific T cells (such as allogeneic antigen specific T cells) comprising the steps culturing in a gas permeable vessel a population of PBMCs (such as allogeneic PBMCs) in the presence of a peptide or peptide mix relevant to a target antigen(s), in the presence of an exogenous cytokine characterised in that the cytokine is other than exogenous IL-2.

[0102] In one embodiment there is provided according to the present disclosure in vitro expansion process for rapid expansion of antigen specific T cells, such as allogeneic antigen specific T cells comprising the steps culturing in a gas permeable vessel a population of PBMCs (such as allogeneic PBMCs) in the presence of antigen, for example a peptide or peptide mix relevant to a target antigen(s), in the presence of an exogenous cytokine characterised in that the expansion to provide the desired population of T cells is 14 days or less, for example 9, 10, 11 or 12 days, such as 10 days.

[0103] Cytokines that may be employed in the process of the current disclosure include IL-1, IL-2, IL-4, IL-6 IL-7, IL-12 and IL-15.

[0104] A large amount of, as yet non-definitive, literature underlines how IL-2, IL-7 and IL-15 play non-redundant roles in shaping the representation of memory cells. IL-2 controls T-cell clonal expansion and contraction, and promotes lymphocyte differentiation. IL-2 and IL-15 can also support memory cell division and have been used in combination with antigen-driven stimulation, for the expansion of CTL.

[0105] IL-7 regulates peripheral T-cell homeostasis, and contributes to the generation and long-term survival of both CD41 and CD81 memory T lymphocytes in vivo.

[0106] In one embodiment the cytokines employed in the expansion process according to the present disclosure are independently selected from IL-4, IL-7 and IL-15, especially IL-4 and IL-7.

[0107] In one embodiment the cytokines employed are IL-4 and/or IL-7. Whilst not wishing to be bound by theory the

inventors believe that these cytokines have a role to play in shaping the frequency, repertoire and expansion of viral antigen-specific T cells.

[0108] In one embodiment the method according to the present disclosure provides a T cell population which has a repertoire of antigen-specific T cells.

[0109] The repertoire of T cells may be determined by ELISPOT analysis after stimulation with peptide libraries aliquotted into pools such that each peptide is uniquely represented in two pools (Kern, F., N. Faulhaber, C. Frommel, E. Khatamzas, S. Prosch, C. Schonemann, I. Kretzschmar, R. Volkmer-Engert, H. D. Volk, and P. Reinke. 2000. Analysis of CD8 T cell reactivity to cytomegalovirus using protein-spanning pools of overlapping pentadecapeptides. Eur J Immunol. 30:1676-1682 and Straathof, K. C., A. M. Leen, E. L. Buza, G. Taylor, M. H. Huls, H. E. Heslop, C. M. Rooney, and C. M. Bollard. 2005. Characterization of latent membrane protein 2 specificity in CTL lines from patients with EBV-positive nasopharyngeal carcinoma and lymphoma. J. Immunol. 175: 4137-4147) or by intracellular cytokine staining by plating 200,000 of the final T cell product in a round bottomed 96 well plate and using peptides as above to re-stimulate the cells at a concentration of 1 ug/ml. This is performed overnight in the presence of 5 ug/ml of Brefeldin A which prevents secretion of cytokine and therefore is used to ensure build-up of IFNg inside the cells for enumeration using flow cytometry.

[0110] IL-4 is generally employed at a final concentration of 250 ng/ml of culture or less, such as 200 ng/ml or less.

[0111] IL-7 is generally employed at a final concentration of 50 ng/ml of culture or less, such as 20 ng/ml or less, in particular 10 ng/ml.

[0112] If IL-15 is employed a suitable final concentration is 50 ng/ml of culture or less, such as 20 ng/ml or less, in particular 10 ng/ml.

[0113] In one embodiment in about 20 mls per GRex-10 (for example 20×10^6 PBMCs) a further 10 mls medium containing IL-4 (1666 units per mL) and IL-7 (long per ml) is added.

[0114] IL-12 has a role in Th1 focussing and exogenous IL-12 may be omitted if a balanced Th1/Th2 is desired. In one embodiment the process of the present disclosure does not employ exogenous IL-12. However, in the context of the present T cell product a Th1 response in the CD4+ population is thought to be desirable.

[0115] In one embodiment when IL-4 is employed the in the expansion process of the present disclosure. At day 10 or day 11 the number of expanded cells may be 10, 20, 30, 40 50, 60, 70, 80, 90, 100 or 200% higher than cells expanded employing a similar protocol replacing IL-4 with IL-2.

[0116] When exogenous IL-2 is employed in the rapid expansion system hyper-proliferation of T cells is generated. When this hyper-rapid expansion occurs then the balance of desirable T cells and the residual cells is suboptimal in that the expansion happens so rapidly that many that the residual cells have not died and thus remain present in the total cell population. Thus the present inventors have reconciled the inherently incompatible factors of rapid expansion with the selectivity of culturing the cells for a period of time which allows death of the non-target cells and have found that the omission of IL-2 improves the ratio of desired cells to residual cells. What is more in the period 7 to 14 days such as 10 days the ratio of desired cells to residual cells is a cross-over point where the cultured product becomes suitable for use in therapy. This cross-over point is defined as when a sufficient minimum dose of therapeutic T cells is achieved within a dose formulation which falls within the safety threshold of no more than 5×10^5CD3+ T cells per kg of patient body weight.

[0117] In one embodiment the T cell population as allogeneic, that is to say the T cell population is derived from a donor who is not the patient.

[0118] Generally the donor will be fully HLA matched.

[0119] The human leukocyte antigen (HLA) system is the name of the major histocompatibility complex (MHC) in humans. The super locus contains a large number of genes related to immune system function in humans. This group of genes resides on chromosome 6, and encode cell-surface antigen-presenting proteins and many other genes. The HLA genes are the human versions of the MHC genes that are found in most vertebrates (and thus are the most studied of the MHC genes). The proteins encoded by certain genes are also known as antigens, as a result of their historic discovery as factors in organ transplants. The major HLA antigens are essential elements for immune function. Different classes have different functions:

[0120] HLAs corresponding to MHC class I (A, B, and C) present peptides from inside the cell (including viral peptides if present). These peptides are produced from digested proteins that are broken down in the proteasomes. In general, the peptides are small polymers, about 9 amino acids in length. Foreign antigens attract killer T-cells (also called CD8 positive- or cytotoxic T-cells) that destroy cells. HLAs corresponding to MHC class II (DP,DM, DOA,DOB,DQ, and DR) present antigens from outside of the cell to T-lymphocytes. These particular antigens stimulate the multiplication of T-helper cells, which in turn stimulate antibody-producing B-cells to produce antibodies to that specific antigen. Self-antigens are suppressed by suppressor T-cells.

[0121] In one embodiment the selection of cells is based on the interferon-gamma secretion or a cell surface activation marker, after stimulation of the cells with antigen, in particular peptides of a relevant antigen.

[0122] In one embodiment the mobilised blood sample obtained from the donor may be cryopreserved before processing.

[0123] In one embodiment after expansion optionally one or more components such as stabilising agents and/or cryopreservants are added to the formulation, for example human serum albumin, glycerol, DMSO or similar.

[0124] The present invention also extends to compositions comprising the allogeneic antigen-specific T cell populations according to the invention. These compositions, may comprise a diluent, carrier, stabilizer, surfactant, pH adjustment or any other pharmaceutically acceptable excipient added to the cell population after the main process steps. An excipient will generally have a function of stabilizing the formulation, prolonging half-life, rendering the composition more compatible with the in vivo system of the patient or the like.

[0125] In one embodiment a protein stabilizing agent is added to the cell culture after manufacturing, for example albumin, in particular human serum album, which may act as a stabilizing agent. The amounts albumin employed in the formulation may be 10 to 50% w/w, such as about 12.5% w/w.

[0126] In one embodiment the formulation also contains a cryopreservative, for example glycerol or DMSO. The quantity of DMSO is generally 12% or less such as about 10% w/w.

[0127] In one embodiment the process of the present invention comprises the further step of preparing a pharmaceutical

formulation by adding a pharmaceutically acceptable excipient, in particular an excipient as described herein, for example diluent, stabilizer and/or preservative.

[0128] Excipient as employed herein is a generic term to cover all ingredients added to the T cell population that do not have a biological or physiological function.

[0129] In one embodiment the pharmaceutical composition is adapted for administration by infusion.

[0130] In one embodiment the target virus to which an antigen specific T cell population is generated is CMV and, for example the antigen employed to the target the virus is pp65. The sequence for human cytomegalovirus (strain AD169) is in the UniProt database under number P06725. The recombinant protein can be purchased from Miltenyi Biotech. The latter company also provide PepTivator® CMV pp65 which is a peptide pool that consists mainly of 15-mer peptides with 11-amino acid (aa) overlap, covering the complete sequence of the pp65 protein of human cytomegalovirus.

[0131] In aspect the disclosure extends to a T cell product obtained or obtainable from the present method.

[0132] In one aspect the disclosure extends a virus specific expanded T cell product

[0133] In one embodiment the disclosure extends treatment or prophylaxis of a patient with a T cell product according to the present disclosure or a composition comprising the same 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 weeks or more after receiving a bone marrow transplant or peripheral stem cell transplant.

[0134] All citation and documents referred herein are specifically incorporated by reference. All references to literature and patent documents are incorporated by reference.

[0135] Comprising in the context of the present invention means including.

[0136] Described above are embodiments comprising certain integers. Embodiments of the invention described above can be combined as technically appropriate. The present disclosure also extends to corresponding embodiments consisting of said integers as herein described.

EXAMPLES

Example 1

Blood Donors and Cell Preparation

[0137] We obtained blood samples from both G-CSF mobilised and non-mobilised healthy donors after a 3-5 hour leukapheresis. Informed consent was obtained in accordance with the Declaration of Helsinki and studies were approved by the Royal Free NHS Trust Research and Development review board. Peripheral blood mononuclear cells (PBMC) were generated using Ficol (Axis Shield Diagnostics) density gradient separation and cultured in RPMI 1640 Medium (Gibco) supplemented with 1% antibiotic (Gibco) and 10% heat inactivated human AB serum (Biosera) at a concentration of 1×10^7/ml. Excess PBMC were cryopreserved at 1:1 with human serum albumin (HSA) 4.5% (Bio Products Laboratory) containing 20% DMSO (WakChemie) as a future source of feeder cells. PBMC were stimulated for up to 24 hours in 6 well culture plates (Nunc) with CMVpp65 Peptivator (Miltenyi Biotec) at 37° C./5% CO_2. For CD154 experiments cultures were stimulated in the presence of 1 μg/ml anti-CD40 antibody (BioLegend)

Flow Cytometry Analysis

[0138] Flow cytometry experiments consisted of four to six colour panels where a minimum of 50,000 CD3+ were acquired after gating of viable lymphocytes using FSC and SSC signals on a FACScan flow cytometer (Cytek UK) and data analysed using FlowJo version 7.6 (TreeStar). For isotype control staining of cytokines and activation markers we used PE-conjugated mouse IgG1 κ antibodies (BD Bioscience). Cells were stained for 15 minutes in the dark, washed in 2 ml of HBSS for 5 minutes and resuspended in 204.1 of FACS Flow (BD Bioscience) before acquisition. Cytokine analysis of supernatants from CMVpp65 stimulated and untouched PBMC were performed on a FACS Aria flow cytometer (BD Biosciences) and a minimum of 20,000 events collected.

Cytokine Analysis by Cytometric Bead Array (CBA)

[0139] Supernatants were collected from CMVpp65 stimulated and non-stimulated control cultures at 16-24 hours from both mobilised and non-mobilised donors and stored at −80° C. Analysis by Cytometric Bead Array Kit (BD Biosciences) was used to quantify the level of IL-2, IL-4, IL-5, IL-10, IFN-γ and TNF. Analysis of acquired data was performed using FCAP Array Software version 1.0.1 (Soft Flow Hungary Ltd.).

Time Course Assay

[0140] PBMC isolated from mobilised and non-mobilised donors were stimulated in 96 well plates at a concentration of 1×10^7/ml for 24 hours with either CMVpp65 Peptivator or 1 μg/ml SEB (Sigma) or left untouched. Samples were taken at 1, 4, 6, 16 and 24 hours and stained with APC-conjugated anti-CD3, FITC-conjugated anti-CD4, PerCP-conjugated anti-CD8 and either PE-conjugated anti-CD154, anti-CD25, anti-CD69 or anti-CD137 (all BD Bioscience).

Isolation of Antigen Specific T Cells

[0141] For the isolation of antigen-specific T cells following CMVpp65 stimulation cells were either stained with PE-conjugated anti-CD25 after 16 hours or PE-conjugated anti-CD154 after 6 hours (both BD Bioscience). Labelling was performed for 20 minutes using 10 μl of antibody per 10^7 cells in 100 μl of CliniMACS buffer. After 20 minute incubation with PE-conjugated microbeads (20 μl/10^7 cells) in 84.1 of CliniMACS buffer the cell suspension was enriched using MS columns on a MiniMACS (all Miltenyi Biotec). All incubation steps were performed at 4-8° C. in the dark. Antigen-specific T cells were also isolated using the IFN-γ secretion assay according to the manufacturer's recommendation (Miltenyi Biotec) and isolation was identical to that of CD154 and CD25 separation.

[0142] This was also performed on steady state specificity markers such as the specific T cell receptor whereby Stage/IBA product-streptamers were used as the selection reagent and on a clinical scale using the CliniMACS for selection.

Expansion of Antigen-Specific T Cell Lines

[0143] After a 6 hour incubation, we cultured up to 0.25×10^6 isolated CD154+ cells in the presence of 50:1 γ-irradiated (30 Gy) autologous PBMC to act as feeder cells in 24 well plates with RPMI 1640 medium containing 10% human AB serum, 1% antibiotic and supplemented with 10 ng/ml of IL-7

and IL-15 (Cell Genix). Culture medium was replenished every 2-3 days and cells split when necessary. Cells were expanded up to a maximum of 23 days before harvest.

[0144] Where cells were not selected prior to expansion, cells were seeded at 2×10e6 PBMC per ml in 20 ml in the G-rex10 expansion system from Wilson Wolf. The cells were seeded with the specific peptide, IL-4 and IL-7 in RPMI 10% human serum and were cultured un-touched for 10 days.

Re-Stimulation of Expanded Antigen-Specific T Cell Lines

[0145] We restimulated expanded cells for a period of 5-6 hours with either CMVpp65 Peptivator, CMV IE-1 (JPT) loaded autologous PBMC or untouched autologous PBMC as a control, all labelled with 1 μM CFSE (Sigma) at a ratio of 2.5:1 at a concentration of 1×10^7/ml in 48 well plates. For analysis of intracellular cytokines and CD154 we incubated cells in the presence of anti-CD28 antibody (BD Bioscience) and added 1 μg/ml of Brefeldin A (Sigma) after 2 hours. Cells were fixed and permeabilised using Intrastain (DakoCytomation) according to the manufacturer's instructions and stained with APC-conjugated anti-CD154, PerCP-conjugated anti-CD4 either PE-conjugated anti-IL-2, anti-TNF or anti IFN-γ (all BD Biosciences). For surface staining cells were incubated in the presence of anti-CD40 antibody and then stained for 10 minutes with FITC-conjugated anti-CD4, PE-conjugated anti-CD154, PerCP-conjugated anti-CD8, APC-conjugated anti-CD3 and APC Cy7-conjugated CD69 (all BD Biosciences).

Cytotoxicity Assay

[0146] Autologous PBMC were stimulated with 3 μg/ml of PHA (Sigma) for 24 hours and then 20 U/ml of IL-2 (Miltenyi Biotec) at a concentration of 1×10^6/ml in RPMI 1640 with 10% AB serum. PHA blasts were then loaded with CMVpp65 Peptivator to use as target cells. Loaded target cells were labelled with Calcein-AM (Molecular Probes) at a concentration of 10 μM and incubated for 1 hour at 37° C. After four washes in complete medium cells were adjusted to 7×10^4/ml and added to effector cells at E:T ratios ranging from 20:1 to 0.5:1, in triplicate, in U bottom 96 well plates (Corning). Triplicate wells were also set up to measure spontaneous release (target cells only), maximal release (target cells plus 2% Triton X-100) and medium alone. After incubation at 37° C./5% CO_2 for four hours, 100 μl of supernatant was harvested and transferred into new plates. Samples were measured using a BMG FLUOstar Galaxy microplate fluorescence spectrophotometer (MTX Lab Systems Inc.) (excitation filter: 485±9 nm: bandpass filter: 530±9 nm). Data were expressed as arbitrary fluorescent units (AFU) and percent lysis was calculated using the formula [(test release-spontaneous release/maximal release-spontaneous release)×100].

Statistical Analysis

[0147] Analyses were conducted using GraphPad Prism 4.0. The nonparametric Mann-Whitney test was used to determine the statistical significance between G-CSF mobilised and non-mobilised PBMC and a Paired t test for analysing the effect of CD40 blocking on CD154 expression. Statistical significance was achieved when P was less than 0.05.

Results

Cytokine Profile of CMVpp65 Stimulated G-CSF Mobilised PBMC

[0148] Initial experiments aimed to investigate the cytokine profile of CMVpp65 stimulated PBMC from G-CSF mobilised PBMC to determine whether there was equivalence with non mobilised PBMC. PBMC from CMV+ healthy individuals were stimulated with CMVpp65 overlapping peptides in 16 hour cultures. After 16 hours aliquots of supernatant were taken from stimulated and untouched cultures and frozen at −80° C. Supernatants were assayed for the cytokines released during the culture period using a flow cytometric based assay, the cytokine bead array (CBA). IL-2, TNF, IFN-γ, IL-10, IL-4 and IL-5 secretion were analysed (FIG. **1**). No significant difference was observed between G-CSF mobilised and non-mobilised PBMC in terms of the TH_1 cytokines IL-2, TNF and IFN-γ, but a significant decrease in IL-10 secretion from G-CSF mobilised PBMC ($P=0.01$) was detected and this trend was also evident in the low levels of IL-4 and IL-5 secretion.

[0149] Next we evaluated whether CMV-specific T cells could be isolated from G-CSF mobilised PBMC based on IFN-γ secretion, as we have used this system previously for the manufacture of CMV-specific T cells from non-mobilised PBMC and demonstrated their clinical efficacy. Cells secreting IFN-γ in response to CMVpp65 stimulation were captured using IFN-γ specific antibodies and selected using magnetic beads. IFN-γ was measured before and after magnetic enrichment to assess purity and yield between mobilised and non-mobilised PBMC. Although not significant we showed that IFN-γ secretion was decreased after CMVpp65 stimulation (FIG. **2**A) and that purity and yield (FIG. **2**B) were also negatively affected in G-CSF mobilised PBMC. The ratio of CD4+ to CD8+ IFN-γ secreting cells appeared to be unchanged in G-CSF mobilised PBMC. In summary PBMC from G-CSF mobilised PBMC are capable of secreting IFN-γ and other effector cytokines at a level similar to non mobilised PBMC, but isolation and detection after CMVpp65 stimulation on a per cell basis appears to be impaired. These results are in line with previously published data suggesting that G-CSF mobilisation impairs the potential for IFN-γ production at a single cell level.[25]

Analysis of Activation Marker Expression after CMVpp65 Stimulation

[0150] We next investigated the kinetics of activation induced CD25, CD69, CD154 and CD137 expression on CMVpp65 specific T cells in G-CSF mobilised PBMC to determine the optimal duration of stimulation in comparison to non-mobilised PBMC. We stimulated PBMC over a 24 hour period with CMVpp65 peptides and removed PBMC populations from cultures at 1, 4, 6, 16 and 24 hours and then analysed for surface expression of activation markers by flow cytometry (FIG. **3**). Antigen triggered expression of CD25 was optimal at 16 hours and was of the same intensity in G-CSF mobilised and non-mobilised PBMC. CD69 and CD154 were optimal at 6hrs and expression of both was elevated in G-CSF mobilised PBMC. CD137 expression reached peak intensity at 24 hours and was also increased in G-CSF mobilised PBMC. In line with previous results we observed a reduction in the level of IFN-γ secretion from G-CSF mobilised PBMC at 16 hours after CMVpp65 stimulation.

Assessment of Antigen Specific Expression of CD154 in G-CSF Mobilised PBMC

[0151] Previously published data have demonstrated that CD154 is a suitable marker for the detection and isolation of CMV-specific T cells. We therefore investigated whether CD154 expression in G-CSF mobilised PBMC was consistent with non-mobilised PBMC, using a CD40-specific antibody to preserve CD154 at the cell surface by preventing ligation with CD40. PBMC were stimulated with either SEB or CMVpp65 peptides for 4-6 hours in the presence or absence of CD40-specific antibody, and then analysed for CD154 expression amongst the CD4+ T cell population (FIG. **4**A).

[0152] Low background CD154 expression in resting CD4+ T cells was comparable between G-CSF mobilised PBMC (0.30%) and non-mobilised PBMC (0.22%). CD154 expression in the presence of CD40-specific antibody at the optimal time point of 6 hours, showed no statistical significant difference between G-CSF mobilised PBMC (1.86%) and non-mobilised PBMC (1.22%) but was in fact elevated in the G-CSF mobilised donor setting (FIG. **4**B-C), without any unspecific activation induced CD154 expression.

[0153] Isolation of Antigen-Specific T Cells from G-CSF Mobilised and Non-Mobilised PBMC through CD154 Expression

[0154] We next performed a single enrichment step of CMVpp65 stimulated PBMC in the presence of CD40-specific antibody from G-CSF mobilised and non-mobilised PBMC (FIG. **5**A-B) using magnetic cell separation in 4 CMV+ healthy unpaired donors. We observed no significant difference in the purity of CD154+ CMV-specific T cells (FIG. **5**C) between G-CSF mobilised (48.94%) and non-mobilised (58.08%) PBMC. CD154 positive fractions were subsequently expanded in short term culture to determine in vitro proliferation and CMV specificity of isolated cells.

Re-Stimulation of in-vitro Expanded Antigen-Specific from G-CSF Mobilised PBMC

[0155] CD154+ CMV-specific T cells were cultured over 21 days in complete medium containing IL-7 and IL-15 in the presence of autologous irradiated feeder cells. CD154+ responder populations showed a mean amplification factor of 74.6-fold (range 48-84) in G-CSF mobilised PBMC (n=3) compared to 103.6 (range 18-168) in non-mobilised PBMC (n=3). Expanded cells were predominantly CD3+ CD4+ in all cultures (FIG. **6**A) All cultures showed high specificity for CMVpp65 determined by up regulation of CD154+ and CD69+ expression upon re-challenge with autologous CMVpp65 loaded PBMC. In control re-challenge experiments with autologous PBMC alone, low to undetectable levels of CD154 expression was observed (FIG. **6**B). We observed an increase in the up-regulation of CD154+ CD69+ expression upon re-challenge in cells expanded from G-CSF mobilised PBMC (mean, 93.13%) compared to non-mobilised PBMC (mean, 63.0%) after flow cytometric analysis (FIG. **6**C). In some experiments expanded cells were re-challenged with CMV IE-1 peptides and no CD154 activation was observed confirming specificity (data not shown).

[0156] To analyse the functionality of expanded cells we also tested for production of IL-2, TNF and IFN-γ by intracellular cytokine staining (ICS) (FIG. **6**D). Expanded cells were capable of synthesising and secreting all three cytokines, but predominantly IFN-γ. In experiments where expanded cells were unstimulated or incubated with CMV IE-1 peptides, minimal cytokine secretion was observed. No significant differences were detected in IL-2, TNF or IFN-γ secretion between G-CSF mobilised PBMC and non-mobilised PBMC (FIG. **6**E). We have demonstrated that the CD154 assay allows for specific isolation of both expandable and functional CMV-specific T cells from G-CSF mobilised PBMC that is equivalent to published data in non-mobilised PBMC.

Cytotoxic Activity of Expanded Cells

[0157] Finally we investigated whether expanded CD154+ CMV-specific T cells isolated from G-CSF mobilised PBMC are able to lyse target cells. Autologous PHA blasts loaded with CMVpp65 peptides and labelled with Calcein-AM dye were used as targets. Targets were effectively killed by expanded cells (FIG. **7**) at all E:T ratios.

Example 2

Analysis of Cells Obtained from the Negative Fraction of CD34 Selection

[0158] The starting material was the negative fraction from a CD34 selection from mobilised HPC-A (also referred to herein as an apheresis sample).

[0159] Cells underwent density gradient centrifugation prior to being cultured for 10 days with ADV peptide, IL-4 and IL-7. On day 10 cells were harvested, washed, counted, dosed and cryopreserved. Potency testing for gamma production and phenotyping for purity and viability was also performed.

[0160] Doses of 1×10^4 and 1×10^5 T cell per Kg were frozen (12 Kg).

[0161] 7.56% of T cells produced IFNγ following re-stimulation with ADV peptide (release criteria states 1%) and all other release criteria (T cell purity, viability, microbiology, mycoplasma, endotoxin) were met. The scatter plot for this analysis is shown in FIG. **11**.

[0162] PBMC derived from mobilised and non-mobilised material can be accepted as starting material for the process.

[0163] No paired samples have been analysed however 9 production runs have been performed on each starting material. Below is a table showing the % IFNg production upon re-stimulation for both mobilised and non-mobilised product

Mobilised product		Non mobilised product	
	1.32		2.22
	2.45		1.85
	5.26		0.24
	1.95		13.86
	6.53		21.19
	1.31		1.95
	7.56		2.71
	3.62		4.89
	1.54		17.38
Mean	3.5	Mean	7.3
SD	2.4	SD	7.9

Example 3

[0164] The data in FIGS. **12** and **13** show that antigen specific T cells are functional even when derived from an original sample which is mobilised. PBMC derived from mobilised apheresis were stained with CFSE—a dye that is taken up by cells and when a cell divides the brightness of the cells is reduced and this can be detected by flow cytometry. The cells were cultured for 5 days at 37 deg C. with either no stimulation (nil) or with the antigen specific peptide, prior to being stained for streptamer, CD3, CD8 and run on a flow

cytometer. This shows that the cells can proliferate despite being mobilised as long as there is the sufficient stimulus and they will not proliferate unless the stimulus is there—showing function.

Example 4

Treatment of a Patient

[0165] Cells were selected by gamma catch from a frozen mobilised apheresis sample and were used for the treatment of a 72 Kg patient with refractory CMV (at least 2 months) with CMV retinitis involvement. A dose of about 22,000 CMV specific T cells was administered by infusion. Following treatment CMV and retinitis resolved and the patient was discharged from hospital. Thus despite the mobilisation the cells administered were functional. The FIG. **14** shows that some gamma was produced in the pre selection population, it was reduced in the negative fraction and the positive fraction was the product that was actually administered to the patient

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<210> SEQ ID NO 61
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein EBNA1 fragment

<400> SEQUENCE: 61

Thr Thr Asp Glu Gly Thr Trp Val Ala Gly Val Phe Val Tyr Gly
1 5 10 15

<210> SEQ ID NO 62
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein EBNA1 fragment

<400> SEQUENCE: 62

Gly Thr Trp Val Ala Gly Val Phe Val Tyr Gly Gly Ser Lys Thr
1 5 10 15

<210> SEQ ID NO 63
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein EBNA1 fragment

<400> SEQUENCE: 63

Ala Gly Val Phe Val Tyr Gly Gly Ser Lys Thr Ser Leu Tyr Asn

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1 5 10 15

<210> SEQ ID NO 64
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein EBNA1 fragment)

<400> SEQUENCE: 64

Val Tyr Gly Gly Ser Lys Thr Ser Leu Tyr Asn Leu Arg Arg Gly
1 5 10 15

<210> SEQ ID NO 65
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein EBNA1 fragment

<400> SEQUENCE: 65

Ser Lys Thr Ser Leu Tyr Asn Leu Arg Arg Gly Thr Ala Leu Ala
1 5 10 15

<210> SEQ ID NO 66
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein EBNA1 fragment

<400> SEQUENCE: 66

Leu Tyr Asn Leu Arg Arg Gly Thr Ala Leu Ala Ile Pro Gln Cys
1 5 10 15

<210> SEQ ID NO 67
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein EBNA1 fragment

<400> SEQUENCE: 67

Arg Arg Gly Thr Ala Leu Ala Ile Pro Gln Cys Arg Leu Thr Pro
1 5 10 15

<210> SEQ ID NO 68
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein EBNA1 fragment

<400> SEQUENCE: 68

Ala Leu Ala Ile Pro Gln Cys Arg Leu Thr Pro Leu Ser Arg Leu
1 5 10 15

<210> SEQ ID NO 69
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein EBNA1 fragment

<400> SEQUENCE: 69

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Pro Gln Cys Arg Leu Thr Pro Leu Ser Arg Leu Pro Phe Gly Met
1 5 10 15

<210> SEQ ID NO 70
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein EBNA1 fragment

<400> SEQUENCE: 70

Leu Thr Pro Leu Ser Arg Leu Pro Phe Gly Met Ala Pro Gly Pro
1 5 10 15

<210> SEQ ID NO 71
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein EBNA1 fragment

<400> SEQUENCE: 71

Ser Arg Leu Pro Phe Gly Met Ala Pro Gly Pro Gly Pro Gln Pro
1 5 10 15

<210> SEQ ID NO 72
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein EBNA1 fragment

<400> SEQUENCE: 72

Phe Gly Met Ala Pro Gly Pro Gly Pro Gln Pro Gly Pro Leu Arg
1 5 10 15

<210> SEQ ID NO 73
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein EBNA1 fragment

<400> SEQUENCE: 73

Pro Gly Pro Gly Pro Gln Pro Gly Pro Leu Arg Glu Ser Ile Val
1 5 10 15

<210> SEQ ID NO 74
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein EBNA1 fragment

<400> SEQUENCE: 74

Pro Gln Pro Gly Pro Leu Arg Glu Ser Ile Val Cys Tyr Phe Met
1 5 10 15

<210> SEQ ID NO 75
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein EBNA1 fragment

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<400> SEQUENCE: 75

Pro Leu Arg Glu Ser Ile Val Cys Tyr Phe Met Val Phe Leu Gln
1 5 10 15

<210> SEQ ID NO 76
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein EBNA1 fragment

<400> SEQUENCE: 76

Ser Ile Val Cys Tyr Phe Met Val Phe Leu Gln Thr His Ile Phe
1 5 10 15

<210> SEQ ID NO 77
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein EBNA1 fragment

<400> SEQUENCE: 77

Tyr Phe Met Val Phe Leu Gln Thr His Ile Phe Ala Glu Val Leu
1 5 10 15

<210> SEQ ID NO 78
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein EBNA1 fragment

<400> SEQUENCE: 78

Phe Leu Gln Thr His Ile Phe Ala Glu Val Leu Lys Asp Ala Ile
1 5 10 15

<210> SEQ ID NO 79
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein EBNA1 fragment

<400> SEQUENCE: 79

His Ile Phe Ala Glu Val Leu Lys Asp Ala Ile Lys Asp Leu Val
1 5 10 15

<210> SEQ ID NO 80
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein EBNA1 fragment

<400> SEQUENCE: 80

Glu Val Leu Lys Asp Ala Ile Lys Asp Leu Val Met Thr Lys Pro
1 5 10 15

<210> SEQ ID NO 81
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae

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<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein EBNA1 fragment

<400> SEQUENCE: 81

Asp Ala Ile Lys Asp Leu Val Met Thr Lys Pro Ala Pro Thr Cys
1 5 10 15

<210> SEQ ID NO 82
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein EBNA1 fragment

<400> SEQUENCE: 82

Asp Leu Val Met Thr Lys Pro Ala Pro Thr Cys Asn Ile Arg Val
1 5 10 15

<210> SEQ ID NO 83
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein EBNA1 fragment

<400> SEQUENCE: 83

Thr Lys Pro Ala Pro Thr Cys Asn Ile Arg Val Thr Val Cys Ser
1 5 10 15

<210> SEQ ID NO 84
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein EBNA1 fragment

<400> SEQUENCE: 84

Pro Thr Cys Asn Ile Arg Val Thr Val Cys Ser Phe Asp Asp Gly
1 5 10 15

<210> SEQ ID NO 85
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein EBNA1 fragment

<400> SEQUENCE: 85

Ile Arg Val Thr Val Cys Ser Phe Asp Asp Gly Val Asp Leu Pro
1 5 10 15

<210> SEQ ID NO 86
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein EBNA1 fragment

<400> SEQUENCE: 86

Val Cys Ser Phe Asp Asp Gly Val Asp Leu Pro Pro Trp Phe Pro
1 5 10 15

<210> SEQ ID NO 87
<211> LENGTH: 15

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<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein EBNA1 fragment

<400> SEQUENCE: 87

Asp Asp Gly Val Asp Leu Pro Pro Trp Phe Pro Pro Met Val Glu
1 5 10 15

<210> SEQ ID NO 88
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein EBNA1 fragment

<400> SEQUENCE: 88

Asp Leu Pro Pro Trp Phe Pro Pro Met Val Glu Gly Ala Ala Ala
1 5 10 15

<210> SEQ ID NO 89
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein EBNA1 fragment

<400> SEQUENCE: 89

Trp Phe Pro Pro Met Val Glu Gly Ala Ala Ala Glu Gly Asp Asp
1 5 10 15

<210> SEQ ID NO 90
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein EBNA1 fragment

<400> SEQUENCE: 90

Met Val Glu Gly Ala Ala Ala Glu Gly Asp Asp Gly Asp Asp Gly
1 5 10 15

<210> SEQ ID NO 91
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein EBNA1 fragment

<400> SEQUENCE: 91

Ala Ala Ala Glu Gly Asp Asp Gly Asp Asp Gly Asp Glu Gly Gly
1 5 10 15

<210> SEQ ID NO 92
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein EBNA1 fragment

<400> SEQUENCE: 92

Gly Asp Asp Gly Asp Asp Gly Asp Glu Gly Gly Asp Gly Asp Glu
1 5 10 15

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<210> SEQ ID NO 93
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein EBNA1 fragment

<400> SEQUENCE: 93

Asp Asp Gly Asp Glu Gly Gly Asp Gly Asp Glu Gly Glu Glu Gly
1 5 10 15

<210> SEQ ID NO 94
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein EBNA1 fragment

<400> SEQUENCE: 94

Glu Gly Gly Asp Gly Asp Glu Gly Glu Glu Gly Gln Glu
1 5 10

<210> SEQ ID NO 95
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 95

Met Glu His Asp Leu Glu Arg Gly Pro Pro Gly Pro Arg Arg Pro
1 5 10 15

<210> SEQ ID NO 96
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 96

Leu Glu Arg Gly Pro Pro Gly Pro Arg Arg Pro Pro Arg Gly Pro
1 5 10 15

<210> SEQ ID NO 97
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 97

Pro Pro Gly Pro Arg Arg Pro Pro Arg Gly Pro Pro Leu Ser Ser
1 5 10 15

<210> SEQ ID NO 98
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 98

Arg Arg Pro Pro Arg Gly Pro Pro Leu Ser Ser Ser Leu Gly Leu
1 5 10 15

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<210> SEQ ID NO 99
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 99

Leu Phe Trp Leu Tyr Ile Val Met Ser Asp Trp Thr Gly Gly Ala
1 5 10 15

<210> SEQ ID NO 100
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV - protein LMP1 fragment

<400> SEQUENCE: 100

Tyr Ile Val Met Ser Asp Trp Thr Gly Gly Ala Leu Leu Val Leu
1 5 10 15

<210> SEQ ID NO 101
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV - protein LMP1 fragment

<400> SEQUENCE: 101

Ser Asp Trp Thr Gly Gly Ala Leu Leu Val Leu Tyr Ser Phe Ala
1 5 10 15

<210> SEQ ID NO 102
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV - protein LMP1 fragment

<400> SEQUENCE: 102

Gly Gly Ala Leu Leu Val Leu Tyr Ser Phe Ala Leu Met Leu Ile
1 5 10 15

<210> SEQ ID NO 103
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus
<220> FEATURE:
<223> OTHER INFORMATION: EBV - protein LMP1

<400> SEQUENCE: 103

Leu Val Leu Tyr Ser Phe Ala Leu Met Leu Ile Ile Ile Ile Leu
1 5 10 15

<210> SEQ ID NO 104
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 104

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Ser Phe Ala Leu Met Leu Ile Ile Ile Ile Leu Ile Ile Phe Ile
1 5 10 15

<210> SEQ ID NO 105
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 105

Met Leu Ile Ile Ile Ile Leu Ile Ile Phe Ile Phe Arg Arg Asp
1 5 10 15

<210> SEQ ID NO 106
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 106

Ile Ile Leu Ile Ile Phe Ile Phe Arg Arg Asp Leu Leu Cys Pro
1 5 10 15

<210> SEQ ID NO 107
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 107

Ile Phe Ile Phe Arg Arg Asp Leu Leu Cys Pro Leu Gly Ala Leu
1 5 10 15

<210> SEQ ID NO 108
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 108

Arg Arg Asp Leu Leu Cys Pro Leu Gly Ala Leu Cys Ile Leu Leu
1 5 10 15

<210> SEQ ID NO 109
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 109

Leu Cys Pro Leu Gly Ala Leu Cys Ile Leu Leu Leu Met Ile Thr
1 5 10 15

<210> SEQ ID NO 110
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

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<400> SEQUENCE: 110

Gly Ala Leu Cys Ile Leu Leu Leu Met Ile Thr Leu Leu Leu Ile
1 5 10 15

<210> SEQ ID NO 111
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 111

Ile Leu Leu Leu Met Ile Thr Leu Leu Leu Ile Ala Leu Trp Asn
1 5 10 15

<210> SEQ ID NO 112
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 112

Met Ile Thr Leu Leu Leu Ile Ala Leu Trp Asn Leu His Gly Gln
1 5 10 15

<210> SEQ ID NO 113
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 113

Leu Leu Ile Ala Leu Trp Asn Leu His Gly Gln Ala Leu Tyr Leu
1 5 10 15

<210> SEQ ID NO 114
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 114

Leu Trp Asn Leu His Gly Gln Ala Leu Tyr Leu Gly Ile Val Leu
1 5 10 15

<210> SEQ ID NO 115
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 115

His Gly Gln Ala Leu Tyr Leu Gly Ile Val Leu Phe Ile Phe Gly
1 5 10 15

<210> SEQ ID NO 116
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:

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<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 116

Leu Tyr Leu Gly Ile Val Leu Phe Ile Phe Gly Cys Leu Leu Val
1 5 10 15

<210> SEQ ID NO 117
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 117

Ile Val Leu Phe Ile Phe Gly Cys Leu Leu Val Leu Gly Leu Trp
1 5 10 15

<210> SEQ ID NO 118
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 118

Ile Phe Gly Cys Leu Leu Val Leu Gly Leu Trp Ile Tyr Leu Leu
1 5 10 15

<210> SEQ ID NO 119
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 119

Leu Leu Val Leu Gly Leu Trp Ile Tyr Leu Leu Glu Ile Leu Trp
1 5 10 15

<210> SEQ ID NO 120
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 120

Gly Leu Trp Ile Tyr Leu Leu Glu Ile Leu Trp Arg Leu Gly Ala
1 5 10 15

<210> SEQ ID NO 121
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 121

Tyr Leu Leu Glu Ile Leu Trp Arg Leu Gly Ala Thr Ile Trp Gln
1 5 10 15

<210> SEQ ID NO 122
<211> LENGTH: 15
<212> TYPE: PRT

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<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 122

Ile Leu Trp Arg Leu Gly Ala Thr Ile Trp Gln Leu Leu Ala Phe
1 5 10 15

<210> SEQ ID NO 123
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 123

Leu Gly Ala Thr Ile Trp Gln Leu Leu Ala Phe Phe Leu Ala Phe
1 5 10 15

<210> SEQ ID NO 124
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 124

Ile Trp Gln Leu Leu Ala Phe Phe Leu Ala Phe Phe Leu Asp Leu
1 5 10 15

<210> SEQ ID NO 125
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 125

Leu Ala Phe Phe Leu Ala Phe Phe Leu Asp Leu Ile Leu Leu Ile
1 5 10 15

<210> SEQ ID NO 126
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 126

Leu Ala Phe Phe Leu Asp Leu Ile Leu Leu Ile Ile Ala Leu Tyr
1 5 10 15

<210> SEQ ID NO 127
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 127

Leu Asp Leu Ile Leu Leu Ile Ile Ala Leu Tyr Leu Gln Gln Asn
1 5 10 15

<210> SEQ ID NO 128

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<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 128

Leu Leu Ile Ile Ala Leu Tyr Leu Gln Gln Asn Trp Trp Thr Leu
1 5 10 15

<210> SEQ ID NO 129
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 129

Ala Leu Tyr Leu Gln Gln Asn Trp Trp Thr Leu Leu Val Asp Leu
1 5 10 15

<210> SEQ ID NO 130
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 130

Gln Gln Asn Trp Trp Thr Leu Leu Val Asp Leu Leu Trp Leu Leu
1 5 10 15

<210> SEQ ID NO 131
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 131

Trp Thr Leu Leu Val Asp Leu Leu Trp Leu Leu Leu Phe Leu Ala
1 5 10 15

<210> SEQ ID NO 132
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 132

Val Asp Leu Leu Trp Leu Leu Leu Phe Leu Ala Ile Leu Ile Trp
1 5 10 15

<210> SEQ ID NO 133
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 133

Trp Leu Leu Leu Phe Leu Ala Ile Leu Ile Trp Met Tyr Tyr His
1 5 10 15

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<210> SEQ ID NO 134
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 134

Phe Leu Ala Ile Leu Ile Trp Met Tyr Tyr His Gly Gln Arg His
1 5 10 15

<210> SEQ ID NO 135
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 135

Leu Ile Trp Met Tyr Tyr His Gly Gln Arg His Ser Asp Glu His
1 5 10 15

<210> SEQ ID NO 136
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 136

Tyr Tyr His Gly Gln Arg His Ser Asp Glu His His His Asp Asp
1 5 10 15

<210> SEQ ID NO 137
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 137

Gln Arg His Ser Asp Glu His His His Asp Asp Ser Leu Pro His
1 5 10 15

<210> SEQ ID NO 138
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 138

Asp Glu His His His Asp Asp Ser Leu Pro His Pro Gln Gln Ala
1 5 10 15

<210> SEQ ID NO 139
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 139

His Asp Asp Ser Leu Pro His Pro Gln Gln Ala Thr Asp Asp Ser

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1 5 10 15

<210> SEQ ID NO 140
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 140

Leu Pro His Pro Gln Gln Ala Thr Asp Asp Ser Gly His Glu Ser
1 5 10 15

<210> SEQ ID NO 141
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 141

Gln Gln Ala Thr Asp Asp Ser Gly His Glu Ser Asp Ser Asn Ser
1 5 10 15

<210> SEQ ID NO 142
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 142

Asp Asp Ser Gly His Glu Ser Asp Ser Asn Ser Asn Glu Gly Arg
1 5 10 15

<210> SEQ ID NO 143
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 143

His Glu Ser Asp Ser Asn Ser Asn Glu Gly Arg His His Leu Leu
1 5 10 15

<210> SEQ ID NO 144
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 144

Ser Asn Ser Asn Glu Gly Arg His His Leu Leu Val Ser Gly Ala
1 5 10 15

<210> SEQ ID NO 145
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 145

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Glu Gly Arg His His Leu Leu Val Ser Gly Ala Gly Asp Gly Pro
1 5 10 15

<210> SEQ ID NO 146
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 146

His Leu Leu Val Ser Gly Ala Gly Asp Gly Pro Pro Leu Cys Ser
1 5 10 15

<210> SEQ ID NO 147
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 147

Ser Gly Ala Gly Asp Gly Pro Pro Leu Cys Ser Gln Asn Leu Gly
1 5 10 15

<210> SEQ ID NO 148
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 148

Asp Gly Pro Pro Leu Cys Ser Gln Asn Leu Gly Ala Pro Gly Gly
1 5 10 15

<210> SEQ ID NO 149
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 149

Leu Cys Ser Gln Asn Leu Gly Ala Pro Gly Gly Gly Pro Asp Asn
1 5 10 15

<210> SEQ ID NO 150
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 150

Asn Leu Gly Ala Pro Gly Gly Gly Pro Asp Asn Gly Pro Gln Asp
1 5 10 15

<210> SEQ ID NO 151
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

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<400> SEQUENCE: 151

Pro Gly Gly Gly Pro Asp Asn Gly Pro Gln Asp Pro Asp Asn Thr
1 5 10 15

<210> SEQ ID NO 152
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 152

Pro Asp Asn Gly Pro Gln Asp Pro Asp Asn Thr Asp Asp Asn Gly
1 5 10 15

<210> SEQ ID NO 153
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 153

Pro Gln Asp Pro Asp Asn Thr Asp Asp Asn Gly Pro Gln Asp Pro
1 5 10 15

<210> SEQ ID NO 154
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 154

Asp Asn Thr Asp Asp Asn Gly Pro Gln Asp Pro Asp Asn Thr Asp
1 5 10 15

<210> SEQ ID NO 155
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 155

Asp Asn Gly Pro Gln Asp Pro Asp Asn Thr Asp Asp Asn Gly Pro
1 5 10 15

<210> SEQ ID NO 156
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 156

Gln Asp Pro Asp Asn Thr Asp Asp Asn Gly Pro His Asp Pro Leu
1 5 10 15

<210> SEQ ID NO 157
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae

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<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 157

Asn Thr Asp Asp Asn Gly Pro His Asp Pro Leu Pro His Ser Pro
1 5 10 15

<210> SEQ ID NO 158
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 158

Asn Gly Pro His Asp Pro Leu Pro His Ser Pro Ser Asp Ser Ala
1 5 10 15

<210> SEQ ID NO 159
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 159

Asp Pro Leu Pro His Ser Pro Ser Asp Ser Ala Gly Asn Asp Gly
1 5 10 15

<210> SEQ ID NO 160
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 160

His Ser Pro Ser Asp Ser Ala Gly Asn Asp Gly Gly Pro Pro Gln
1 5 10 15

<210> SEQ ID NO 161
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV - protein LMP1 fragment

<400> SEQUENCE: 161

Asp Ser Ala Gly Asn Asp Gly Gly Pro Pro Gln Leu Thr Glu Glu
1 5 10 15

<210> SEQ ID NO 162
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 162

Asn Asp Gly Gly Pro Pro Gln Leu Thr Glu Glu Val Glu Asn Lys
1 5 10 15

<210> SEQ ID NO 163
<211> LENGTH: 15

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<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 163

Pro Pro Gln Leu Thr Glu Glu Val Glu Asn Lys Gly Gly Asp Gln
1 5 10 15

<210> SEQ ID NO 164
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 164

Thr Glu Glu Val Glu Asn Lys Gly Gly Asp Gln Gly Pro Pro Leu
1 5 10 15

<210> SEQ ID NO 165
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 165

Glu Asn Lys Gly Gly Asp Gln Gly Pro Pro Leu Met Thr Asp Gly
1 5 10 15

<210> SEQ ID NO 166
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 166

Gly Asp Gln Gly Pro Pro Leu Met Thr Asp Gly Gly Gly Gly His
1 5 10 15

<210> SEQ ID NO 167
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 167

Pro Pro Leu Met Thr Asp Gly Gly Gly Gly His Ser His Asp Ser
1 5 10 15

<210> SEQ ID NO 168
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 168

Thr Asp Gly Gly Gly Gly His Ser His Asp Ser Gly His Gly Gly
1 5 10 15

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<210> SEQ ID NO 169
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 169

Gly Gly His Ser His Asp Ser Gly His Gly Gly Gly Asp Pro His
1 5 10 15

<210> SEQ ID NO 170
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 170

His Asp Ser Gly His Gly Gly Gly Asp Pro His Leu Pro Thr Leu
1 5 10 15

<210> SEQ ID NO 171
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 171

His Gly Gly Gly Asp Pro His Leu Pro Thr Leu Leu Leu Gly Ser
1 5 10 15

<210> SEQ ID NO 172
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 172

Asp Pro His Leu Pro Thr Leu Leu Leu Gly Ser Ser Gly Ser Gly
1 5 10 15

<210> SEQ ID NO 173
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 173

Pro Thr Leu Leu Leu Gly Ser Ser Gly Ser Gly Gly Asp Asp Asp
1 5 10 15

<210> SEQ ID NO 174
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 174

Leu Gly Ser Ser Gly Ser Gly Gly Asp Asp Asp Asp Pro His Gly
1 5 10 15

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<210> SEQ ID NO 175
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 175

Gly Ser Gly Gly Asp Asp Asp Asp Pro His Gly Pro Val Gln Leu
1 5 10 15

<210> SEQ ID NO 176
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP1 fragment

<400> SEQUENCE: 176

Asp Asp Asp Asp Pro His Gly Pro Val Gln Leu Ser Tyr Tyr Asp
1 5 10 15

<210> SEQ ID NO 177
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 177

Met Gly Ser Leu Glu Met Val Pro Met Gly Ala Gly Pro Pro Ser
1 5 10 15

<210> SEQ ID NO 178
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 178

Glu Met Val Pro Met Gly Ala Gly Pro Pro Ser Pro Gly Gly Asp
1 5 10 15

<210> SEQ ID NO 179
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 179

Met Gly Ala Gly Pro Pro Ser Pro Gly Gly Asp Pro Asp Gly Tyr
1 5 10 15

<210> SEQ ID NO 180
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 180

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Pro Pro Ser Pro Gly Gly Asp Pro Asp Gly Tyr Asp Gly Gly Asn
1 5 10 15

<210> SEQ ID NO 181
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 181

Gly Gly Asp Pro Asp Gly Tyr Asp Gly Gly Asn Asn Ser Gln Tyr
1 5 10 15

<210> SEQ ID NO 182
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 182

Asp Gly Tyr Asp Gly Gly Asn Asn Ser Gln Tyr Pro Ser Ala Ser
1 5 10 15

<210> SEQ ID NO 183
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 183

Gly Gly Asn Asn Ser Gln Tyr Pro Ser Ala Ser Gly Ser Ser Gly
1 5 10 15

<210> SEQ ID NO 184
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 184

Ser Gln Tyr Pro Ser Ala Ser Gly Ser Ser Gly Asn Thr Pro Thr
1 5 10 15

<210> SEQ ID NO 185
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 185

Ser Ala Ser Gly Ser Ser Gly Asn Thr Pro Thr Pro Pro Asn Asp
1 5 10 15

<210> SEQ ID NO 186
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

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<400> SEQUENCE: 186

Ser Ser Gly Asn Thr Pro Thr Pro Pro Asn Asp Glu Glu Arg Glu
1 5 10 15

<210> SEQ ID NO 187
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 187

Thr Pro Thr Pro Pro Asn Asp Glu Glu Arg Glu Ser Asn Glu Glu
1 5 10 15

<210> SEQ ID NO 188
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 188

Pro Asn Asp Glu Glu Arg Glu Ser Asn Glu Glu Pro Pro Pro Pro
1 5 10 15

<210> SEQ ID NO 189
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 189

Glu Arg Glu Ser Asn Glu Glu Pro Pro Pro Pro Tyr Glu Asp Pro
1 5 10 15

<210> SEQ ID NO 190
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 190

Asn Glu Glu Pro Pro Pro Pro Tyr Glu Asp Pro Tyr Trp Gly Asn
1 5 10 15

<210> SEQ ID NO 191
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 191

Pro Pro Pro Tyr Glu Asp Pro Tyr Trp Gly Asn Gly Asp Arg His
1 5 10 15

<210> SEQ ID NO 192
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:

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<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 192

Glu Asp Pro Tyr Trp Gly Asn Gly Asp Arg His Ser Asp Tyr Gln
1 5 10 15

<210> SEQ ID NO 193
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 193

Trp Gly Asn Gly Asp Arg His Ser Asp Tyr Gln Pro Leu Gly Thr
1 5 10 15

<210> SEQ ID NO 194
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 194

Asp Arg His Ser Asp Tyr Gln Pro Leu Gly Thr Gln Asp Gln Ser
1 5 10 15

<210> SEQ ID NO 195
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 195

Asp Tyr Gln Pro Leu Gly Thr Gln Asp Gln Ser Leu Tyr Leu Gly
1 5 10 15

<210> SEQ ID NO 196
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 196

Leu Gly Thr Gln Asp Gln Ser Leu Tyr Leu Gly Leu Gln His Asp
1 5 10 15

<210> SEQ ID NO 197
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 197

Asp Gln Ser Leu Tyr Leu Gly Leu Gln His Asp Gly Asn Asp Gly
1 5 10 15

<210> SEQ ID NO 198
<211> LENGTH: 15
<212> TYPE: PRT

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<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 198

Tyr Leu Gly Leu Gln His Asp Gly Asn Asp Gly Leu Pro Pro Pro
1 5 10 15

<210> SEQ ID NO 199
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 199

Gln His Asp Gly Asn Asp Gly Leu Pro Pro Pro Pro Tyr Ser Pro
1 5 10 15

<210> SEQ ID NO 200
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 200

Asn Asp Gly Leu Pro Pro Pro Pro Tyr Ser Pro Arg Asp Asp Ser
1 5 10 15

<210> SEQ ID NO 201
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 201

Pro Pro Pro Pro Tyr Ser Pro Arg Asp Asp Ser Ser Gln His Ile
1 5 10 15

<210> SEQ ID NO 202
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 202

Tyr Ser Pro Arg Asp Asp Ser Ser Gln His Ile Tyr Glu Glu Ala
1 5 10 15

<210> SEQ ID NO 203
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 203

Asp Asp Ser Ser Gln His Ile Tyr Glu Glu Ala Gly Arg Gly Ser
1 5 10 15

<210> SEQ ID NO 204

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<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 204

Gln His Ile Tyr Glu Glu Ala Gly Arg Gly Ser Met Asn Pro Val
1 5 10 15

<210> SEQ ID NO 205
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 205

Glu Glu Ala Gly Arg Gly Ser Met Asn Pro Val Cys Leu Pro Val
1 5 10 15

<210> SEQ ID NO 206
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 206

Arg Gly Ser Met Asn Pro Val Cys Leu Pro Val Ile Val Ala Pro
1 5 10 15

<210> SEQ ID NO 207
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 207

Asn Pro Val Cys Leu Pro Val Ile Val Ala Pro Tyr Leu Phe Trp
1 5 10 15

<210> SEQ ID NO 208
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 208

Leu Pro Val Ile Val Ala Pro Tyr Leu Phe Trp Leu Ala Ala Ile
1 5 10 15

<210> SEQ ID NO 209
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 209

Val Ala Pro Tyr Leu Phe Trp Leu Ala Ala Ile Ala Ala Ser Cys
1 5 10 15

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<210> SEQ ID NO 210
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 210

Leu Phe Trp Leu Ala Ala Ile Ala Ala Ser Cys Phe Thr Ala Ser
1 5 10 15

<210> SEQ ID NO 211
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 211

Ala Ala Ile Ala Ala Ser Cys Phe Thr Ala Ser Val Ser Thr Val
1 5 10 15

<210> SEQ ID NO 212
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 212

Ala Ser Cys Phe Thr Ala Ser Val Ser Thr Val Val Thr Ala Thr
1 5 10 15

<210> SEQ ID NO 213
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 213

Thr Ala Ser Val Ser Thr Val Val Thr Ala Thr Gly Leu Ala Leu
1 5 10 15

<210> SEQ ID NO 214
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 214

Ser Thr Val Val Thr Ala Thr Gly Leu Ala Leu Ser Leu Leu Leu
1 5 10 15

<210> SEQ ID NO 215
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 215

Thr Ala Thr Gly Leu Ala Leu Ser Leu Leu Leu Leu Ala Ala Val

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1 5 10 15

<210> SEQ ID NO 216
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 216

Leu Ala Leu Ser Leu Leu Leu Leu Ala Ala Val Ala Ser Ser Tyr
1 5 10 15

<210> SEQ ID NO 217
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 217

Leu Leu Leu Leu Ala Ala Val Ala Ser Ser Tyr Ala Ala Ala Gln
1 5 10 15

<210> SEQ ID NO 218
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 218

Ala Ala Val Ala Ser Ser Tyr Ala Ala Ala Gln Arg Lys Leu Leu
1 5 10 15

<210> SEQ ID NO 219
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 219

Ser Ser Tyr Ala Ala Ala Gln Arg Lys Leu Leu Thr Pro Val Thr
1 5 10 15

<210> SEQ ID NO 220
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 220

Ala Ala Gln Arg Lys Leu Leu Thr Pro Val Thr Val Leu Thr Ala
1 5 10 15

<210> SEQ ID NO 221
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV - protein LMP2 fragment

<400> SEQUENCE: 221

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Lys Leu Leu Thr Pro Val Thr Val Leu Thr Ala Val Val Thr Phe
1 5 10 15

<210> SEQ ID NO 222
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 222

Pro Val Thr Val Leu Thr Ala Val Val Thr Phe Phe Ala Ile Cys
1 5 10 15

<210> SEQ ID NO 223
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 223

Leu Thr Ala Val Val Thr Phe Phe Ala Ile Cys Leu Thr Trp Arg
1 5 10 15

<210> SEQ ID NO 224
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 224

Val Thr Phe Phe Ala Ile Cys Leu Thr Trp Arg Ile Glu Asp Pro
1 5 10 15

<210> SEQ ID NO 225
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 225

Ala Ile Cys Leu Thr Trp Arg Ile Glu Asp Pro Pro Phe Asn Ser
1 5 10 15

<210> SEQ ID NO 226
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 226

Thr Trp Arg Ile Glu Asp Pro Pro Phe Asn Ser Leu Leu Phe Ala
1 5 10 15

<210> SEQ ID NO 227
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

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<400> SEQUENCE: 227

Glu Asp Pro Pro Phe Asn Ser Leu Leu Phe Ala Leu Leu Ala Ala
1 5 10 15

<210> SEQ ID NO 228
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 228

Phe Asn Ser Leu Leu Phe Ala Leu Leu Ala Ala Ala Gly Gly Leu
1 5 10 15

<210> SEQ ID NO 229
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 229

Leu Phe Ala Leu Leu Ala Ala Ala Gly Gly Leu Gln Gly Ile Tyr
1 5 10 15

<210> SEQ ID NO 230
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 230

Leu Ala Ala Ala Gly Gly Leu Gln Gly Ile Tyr Val Leu Val Met
1 5 10 15

<210> SEQ ID NO 231
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 231

Gly Gly Leu Gln Gly Ile Tyr Val Leu Val Met Leu Val Leu Leu
1 5 10 15

<210> SEQ ID NO 232
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 232

Gly Ile Tyr Val Leu Val Met Leu Val Leu Leu Ile Leu Ala Tyr
1 5 10 15

<210> SEQ ID NO 233
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae

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<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 233

Leu Val Met Leu Val Leu Leu Ile Leu Ala Tyr Arg Arg Arg Trp
1 5 10 15

<210> SEQ ID NO 234
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 234

Val Leu Leu Ile Leu Ala Tyr Arg Arg Arg Trp Arg Arg Leu Thr
1 5 10 15

<210> SEQ ID NO 235
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 235

Leu Ala Tyr Arg Arg Arg Trp Arg Arg Leu Thr Val Cys Gly Gly
1 5 10 15

<210> SEQ ID NO 236
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 236

Arg Arg Trp Arg Arg Leu Thr Val Cys Gly Gly Ile Met Phe Leu
1 5 10 15

<210> SEQ ID NO 237
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 237

Arg Leu Thr Val Cys Gly Gly Ile Met Phe Leu Ala Cys Val Leu
1 5 10 15

<210> SEQ ID NO 238
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 238

Cys Gly Gly Ile Met Phe Leu Ala Cys Val Leu Val Leu Ile Val
1 5 10 15

<210> SEQ ID NO 239
<211> LENGTH: 15

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<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 239

Met Phe Leu Ala Cys Val Leu Val Leu Ile Val Asp Ala Val Leu
1 5 10 15

<210> SEQ ID NO 240
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 240

Cys Val Leu Val Leu Ile Val Asp Ala Val Leu Gln Leu Ser Pro
1 5 10 15

<210> SEQ ID NO 241
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 241

Leu Ile Val Asp Ala Val Leu Gln Leu Ser Pro Leu Leu Gly Ala
1 5 10 15

<210> SEQ ID NO 242
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 242

Ala Val Leu Gln Leu Ser Pro Leu Leu Gly Ala Val Thr Val Val
1 5 10 15

<210> SEQ ID NO 243
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 243

Leu Ser Pro Leu Leu Gly Ala Val Thr Val Val Ser Met Thr Leu
1 5 10 15

<210> SEQ ID NO 244
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 244

Leu Gly Ala Val Thr Val Val Ser Met Thr Leu Leu Leu Leu Ala
1 5 10 15

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<210> SEQ ID NO 245
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 245

Thr Val Val Ser Met Thr Leu Leu Leu Leu Ala Phe Val Leu Trp
1 5 10 15

<210> SEQ ID NO 246
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 246

Met Thr Leu Leu Leu Leu Ala Phe Val Leu Trp Leu Ser Ser Pro
1 5 10 15

<210> SEQ ID NO 247
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 247

Leu Leu Ala Phe Val Leu Trp Leu Ser Ser Pro Gly Gly Leu Gly
1 5 10 15

<210> SEQ ID NO 248
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 248

Val Leu Trp Leu Ser Ser Pro Gly Gly Leu Gly Thr Leu Gly Ala
1 5 10 15

<210> SEQ ID NO 249
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 249

Ser Ser Pro Gly Gly Leu Gly Thr Leu Gly Ala Ala Leu Leu Thr
1 5 10 15

<210> SEQ ID NO 250
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 250

Gly Leu Gly Thr Leu Gly Ala Ala Leu Leu Thr Leu Ala Ala Ala
1 5 10 15

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<210> SEQ ID NO 251
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV - protein LMP2 fragment

<400> SEQUENCE: 251

Leu Gly Ala Ala Leu Leu Thr Leu Ala Ala Ala Leu Ala Leu Leu
1 5 10 15

<210> SEQ ID NO 252
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 252

Leu Leu Thr Leu Ala Ala Ala Leu Ala Leu Leu Ala Ser Leu Ile
1 5 10 15

<210> SEQ ID NO 253
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 253

Ala Ala Ala Leu Ala Leu Leu Ala Ser Leu Ile Leu Gly Thr Leu
1 5 10 15

<210> SEQ ID NO 254
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 254

Ala Leu Leu Ala Ser Leu Ile Leu Gly Thr Leu Asn Leu Thr Thr
1 5 10 15

<210> SEQ ID NO 255
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 255

Ser Leu Ile Leu Gly Thr Leu Asn Leu Thr Thr Met Phe Leu Leu
1 5 10 15

<210> SEQ ID NO 256
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 256

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Gly Thr Leu Asn Leu Thr Thr Met Phe Leu Leu Met Leu Leu Trp
1 5 10 15

<210> SEQ ID NO 257
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 257

Leu Thr Thr Met Phe Leu Leu Met Leu Leu Trp Thr Leu Val Val
1 5 10 15

<210> SEQ ID NO 258
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 258

Phe Leu Leu Met Leu Leu Trp Thr Leu Val Val Leu Leu Ile Cys
1 5 10 15

<210> SEQ ID NO 259
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 259

Leu Leu Trp Thr Leu Val Val Leu Leu Ile Cys Ser Ser Cys Ser
1 5 10 15

<210> SEQ ID NO 260
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 260

Leu Val Val Leu Leu Ile Cys Ser Ser Cys Ser Ser Cys Pro Leu
1 5 10 15

<210> SEQ ID NO 261
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 261

Leu Ile Cys Ser Ser Cys Ser Ser Cys Pro Leu Ser Lys Ile Leu
1 5 10 15

<210> SEQ ID NO 262
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

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<400> SEQUENCE: 262

Ser Cys Ser Ser Cys Pro Leu Ser Lys Ile Leu Leu Ala Arg Leu
1 5 10 15

<210> SEQ ID NO 263
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 263

Cys Pro Leu Ser Lys Ile Leu Leu Ala Arg Leu Phe Leu Tyr Ala
1 5 10 15

<210> SEQ ID NO 264
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 264

Lys Ile Leu Leu Ala Arg Leu Phe Leu Tyr Ala Leu Ala Leu Leu
1 5 10 15

<210> SEQ ID NO 265
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 265

Ala Arg Leu Phe Leu Tyr Ala Leu Ala Leu Leu Leu Leu Ala Ser
1 5 10 15

<210> SEQ ID NO 266
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 266

Leu Tyr Ala Leu Ala Leu Leu Leu Leu Ala Ser Ala Leu Ile Ala
1 5 10 15

<210> SEQ ID NO 267
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 267

Ala Leu Leu Leu Leu Ala Ser Ala Leu Ile Ala Gly Gly Ser Ile
1 5 10 15

<210> SEQ ID NO 268
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus
<220> FEATURE:

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<223> OTHER INFORMATION: EBV - protein LMP2

<400> SEQUENCE: 268

Leu Ala Ser Ala Leu Ile Ala Gly Gly Ser Ile Leu Gln Thr Asn
1 5 10 15

<210> SEQ ID NO 269
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 269

Leu Ile Ala Gly Gly Ser Ile Leu Gln Thr Asn Phe Lys Ser Leu
1 5 10 15

<210> SEQ ID NO 270
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 270

Gly Ser Ile Leu Gln Thr Asn Phe Lys Ser Leu Ser Ser Thr Glu
1 5 10 15

<210> SEQ ID NO 271
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 271

Gln Thr Asn Phe Lys Ser Leu Ser Ser Thr Glu Phe Ile Pro Asn
1 5 10 15

<210> SEQ ID NO 272
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 272

Lys Ser Leu Ser Ser Thr Glu Phe Ile Pro Asn Leu Phe Cys Met
1 5 10 15

<210> SEQ ID NO 273
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 273

Ser Thr Glu Phe Ile Pro Asn Leu Phe Cys Met Leu Leu Leu Ile
1 5 10 15

<210> SEQ ID NO 274
<211> LENGTH: 15
<212> TYPE: PRT

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<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223 EBV-protein LMP2 fragment

<400> SEQUENCE: 274

Ile Pro Asn Leu Phe Cys Met Leu Leu Leu Ile Val Ala Gly Ile
1 5 10 15

<210> SEQ ID NO 275
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 275

Phe Cys Met Leu Leu Leu Ile Val Ala Gly Ile Leu Phe Ile Leu
1 5 10 15

<210> SEQ ID NO 276
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 276

Leu Leu Ile Val Ala Gly Ile Leu Phe Ile Leu Ala Ile Leu Thr
1 5 10 15

<210> SEQ ID NO 277
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 277

Ala Gly Ile Leu Phe Ile Leu Ala Ile Leu Thr Glu Trp Gly Ser
1 5 10 15

<210> SEQ ID NO 278
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 278

Phe Ile Leu Ala Ile Leu Thr Glu Trp Gly Ser Gly Asn Arg Thr
1 5 10 15

<210> SEQ ID NO 279
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 279

Ile Leu Thr Glu Trp Gly Ser Gly Asn Arg Thr Tyr Gly Pro Val
1 5 10 15

<210> SEQ ID NO 280

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<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 280

Trp Gly Ser Gly Asn Arg Thr Tyr Gly Pro Val Phe Met Cys Leu
1 5 10 15

<210> SEQ ID NO 281
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 281

Asn Arg Thr Tyr Gly Pro Val Phe Met Cys Leu Gly Gly Leu Leu
1 5 10 15

<210> SEQ ID NO 282
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 282

Gly Pro Val Phe Met Cys Leu Gly Gly Leu Leu Thr Met Val Ala
1 5 10 15

<210> SEQ ID NO 283
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 283

Met Cys Leu Gly Gly Leu Leu Thr Met Val Ala Gly Ala Val Trp
1 5 10 15

<210> SEQ ID NO 284
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 284

Gly Leu Leu Thr Met Val Ala Gly Ala Val Trp Leu Thr Val Met
1 5 10 15

<210> SEQ ID NO 285
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 285

Met Val Ala Gly Ala Val Trp Leu Thr Val Met Ser Asn Thr Leu
1 5 10 15

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<210> SEQ ID NO 286
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 286

Ala Val Trp Leu Thr Val Met Ser Asn Thr Leu Leu Ser Ala Trp
1 5 10 15

<210> SEQ ID NO 287
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 287

Thr Val Met Ser Asn Thr Leu Leu Ser Ala Trp Ile Leu Thr Ala
1 5 10 15

<210> SEQ ID NO 288
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 288

Asn Thr Leu Leu Ser Ala Trp Ile Leu Thr Ala Gly Phe Leu Ile
1 5 10 15

<210> SEQ ID NO 289
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragments

<400> SEQUENCE: 289

Ser Ala Trp Ile Leu Thr Ala Gly Phe Leu Ile Phe Leu Ile Gly
1 5 10 15

<210> SEQ ID NO 290
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 290

Leu Thr Ala Gly Phe Leu Ile Phe Leu Ile Gly Phe Ala Leu Phe
1 5 10 15

<210> SEQ ID NO 291
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 291

Phe Leu Ile Phe Leu Ile Gly Phe Ala Leu Phe Gly Val Ile Arg

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1 5 10 15

<210> SEQ ID NO 292
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 292

Leu Ile Gly Phe Ala Leu Phe Gly Val Ile Arg Cys Cys Arg Tyr
1 5 10 15

<210> SEQ ID NO 293
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 293

Ala Leu Phe Gly Val Ile Arg Cys Cys Arg Tyr Cys Cys Tyr Tyr
1 5 10 15

<210> SEQ ID NO 294
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 294

Val Ile Arg Cys Cys Arg Tyr Cys Cys Tyr Tyr Cys Leu Thr Leu
1 5 10 15

<210> SEQ ID NO 295
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 295

Cys Arg Tyr Cys Cys Tyr Tyr Cys Leu Thr Leu Glu Ser Glu Glu
1 5 10 15

<210> SEQ ID NO 296
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 296

Cys Tyr Tyr Cys Leu Thr Leu Glu Ser Glu Glu Arg Pro Pro Thr
1 5 10 15

<210> SEQ ID NO 297
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 297

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Leu Thr Leu Glu Ser Glu Glu Arg Pro Pro Thr Pro Tyr Arg Asn
1               5                   10                  15


<210> SEQ ID NO 298
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein LMP2 fragment

<400> SEQUENCE: 298

Ser Glu Glu Arg Pro Pro Thr Pro Tyr Arg Asn Thr Val
1               5                   10


<210> SEQ ID NO 299
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein BARF 1 fragment

<400> SEQUENCE: 299

Met Ala Arg Phe Ile Ala Gln Leu Leu Leu Leu Ala Ser Cys Val
1               5                   10                  15


<210> SEQ ID NO 300
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein BARF 1 fragment

<400> SEQUENCE: 300

Ala Gln Leu Leu Leu Leu Ala Ser Cys Val Ala Ala Gly Gln Ala
1               5                   10                  15


<210> SEQ ID NO 301
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein BARF 1 fragment

<400> SEQUENCE: 301

Leu Ala Ser Cys Val Ala Ala Gly Gln Ala Val Thr Ala Phe Leu
1               5                   10                  15


<210> SEQ ID NO 302
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein BARF 1 fragment

<400> SEQUENCE: 302

Ala Ala Gly Gln Ala Val Thr Ala Phe Leu Gly Glu Arg Val Thr
1               5                   10                  15


<210> SEQ ID NO 303
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein BARF 1 fragment
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<400> SEQUENCE: 303

Val Thr Ala Phe Leu Gly Glu Arg Val Thr Leu Thr Ser Tyr Trp
1 5 10 15

<210> SEQ ID NO 304
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein BARF 1 fragment

<400> SEQUENCE: 304

Gly Glu Arg Val Thr Leu Thr Ser Tyr Trp Arg Arg Val Ser Leu
1 5 10 15

<210> SEQ ID NO 305
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus
<220> FEATURE:
<223> OTHER INFORMATION: EBV - protein BARF 1

<400> SEQUENCE: 305

Leu Thr Ser Tyr Trp Arg Arg Val Ser Leu Gly Pro Glu Ile Glu
1 5 10 15

<210> SEQ ID NO 306
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein BARF 1 fragment

<400> SEQUENCE: 306

Arg Arg Val Ser Leu Gly Pro Glu Ile Glu Val Ser Trp Phe Lys
1 5 10 15

<210> SEQ ID NO 307
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein BARF 1 fragment

<400> SEQUENCE: 307

Gly Pro Glu Ile Glu Val Ser Trp Phe Lys Leu Gly Pro Gly Glu
1 5 10 15

<210> SEQ ID NO 308
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein BARF 1 fragment

<400> SEQUENCE: 308

Val Ser Trp Phe Lys Leu Gly Pro Gly Glu Glu Gln Val Leu Ile
1 5 10 15

<210> SEQ ID NO 309
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae

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<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein BARF 1 fragment

<400> SEQUENCE: 309

Leu Gly Pro Gly Glu Glu Gln Val Leu Ile Gly Arg Met His His
1 5 10 15

<210> SEQ ID NO 310
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein BARF 1 fragment

<400> SEQUENCE: 310

Glu Gln Val Leu Ile Gly Arg Met His His Asp Val Ile Phe Ile
1 5 10 15

<210> SEQ ID NO 311
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein BARF 1 fragment

<400> SEQUENCE: 311

Gly Arg Met His His Asp Val Ile Phe Ile Glu Trp Pro Phe Arg
1 5 10 15

<210> SEQ ID NO 312
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein BARF 1 fragment

<400> SEQUENCE: 312

Asp Val Ile Phe Ile Glu Trp Pro Phe Arg Gly Phe Phe Asp Ile
1 5 10 15

<210> SEQ ID NO 313
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein BARF 1 fragment

<400> SEQUENCE: 313

Glu Trp Pro Phe Arg Gly Phe Phe Asp Ile His Arg Ser Ala Asn
1 5 10 15

<210> SEQ ID NO 314
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein BARF 1 fragment

<400> SEQUENCE: 314

Gly Phe Phe Asp Ile His Arg Ser Ala Asn Thr Phe Phe Leu Val
1 5 10 15

<210> SEQ ID NO 315
<211> LENGTH: 15

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<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein BARF 1 fragment

<400> SEQUENCE: 315

His Arg Ser Ala Asn Thr Phe Phe Leu Val Val Thr Ala Ala Asn
1 5 10 15

<210> SEQ ID NO 316
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein BARF 1 fragment

<400> SEQUENCE: 316

Thr Phe Phe Leu Val Val Thr Ala Ala Asn Ile Ser His Asp Gly
1 5 10 15

<210> SEQ ID NO 317
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein BARF 1 fragment

<400> SEQUENCE: 317

Val Thr Ala Ala Asn Ile Ser His Asp Gly Asn Tyr Leu Cys Arg
1 5 10 15

<210> SEQ ID NO 318
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein BARF 1 fragment

<400> SEQUENCE: 318

Ile Ser His Asp Gly Asn Tyr Leu Cys Arg Met Lys Leu Gly Glu
1 5 10 15

<210> SEQ ID NO 319
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein BARF 1 fragment

<400> SEQUENCE: 319

Asn Tyr Leu Cys Arg Met Lys Leu Gly Glu Thr Glu Val Thr Lys
1 5 10 15

<210> SEQ ID NO 320
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein BARF 1 fragment

<400> SEQUENCE: 320

Met Lys Leu Gly Glu Thr Glu Val Thr Lys Gln Glu His Leu Ser
1 5 10 15

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<210> SEQ ID NO 321
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein BARF 1 fragment

<400> SEQUENCE: 321

Thr Glu Val Thr Lys Gln Glu His Leu Ser Val Val Lys Pro Leu
1 5 10 15

<210> SEQ ID NO 322
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein BARF 1 fragment

<400> SEQUENCE: 322

Gln Glu His Leu Ser Val Val Lys Pro Leu Thr Leu Ser Val His
1 5 10 15

<210> SEQ ID NO 323
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein BARF 1 fragment

<400> SEQUENCE: 323

Val Val Lys Pro Leu Thr Leu Ser Val His Ser Glu Arg Ser Gln
1 5 10 15

<210> SEQ ID NO 324
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein BARF 1 fragment

<400> SEQUENCE: 324

Thr Leu Ser Val His Ser Glu Arg Ser Gln Phe Pro Asp Phe Ser
1 5 10 15

<210> SEQ ID NO 325
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein BARF 1 fragment

<400> SEQUENCE: 325

Ser Glu Arg Ser Gln Phe Pro Asp Phe Ser Val Leu Thr Val Thr
1 5 10 15

<210> SEQ ID NO 326
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein BARF 1 fragment

<400> SEQUENCE: 326

Phe Pro Asp Phe Ser Val Leu Thr Val Thr Cys Thr Val Asn Ala
1 5 10 15

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<210> SEQ ID NO 327
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein BARF 1 fragment

<400> SEQUENCE: 327

Val Leu Thr Val Thr Cys Thr Val Asn Ala Phe Pro His Pro His
1 5 10 15

<210> SEQ ID NO 328
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein BARF 1 fragment

<400> SEQUENCE: 328

Cys Thr Val Asn Ala Phe Pro His Pro His Val Gln Trp Leu Met
1 5 10 15

<210> SEQ ID NO 329
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein BARF 1 fragment

<400> SEQUENCE: 329

Phe Pro His Pro His Val Gln Trp Leu Met Pro Glu Gly Val Glu
1 5 10 15

<210> SEQ ID NO 330
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein BARF 1 fragment

<400> SEQUENCE: 330

Val Gln Trp Leu Met Pro Glu Gly Val Glu Pro Ala Pro Thr Ala
1 5 10 15

<210> SEQ ID NO 331
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein BARF 1 fragment

<400> SEQUENCE: 331

Pro Glu Gly Val Glu Pro Ala Pro Thr Ala Ala Asn Gly Gly Val
1 5 10 15

<210> SEQ ID NO 332
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein BARF 1 fragment

<400> SEQUENCE: 332

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Pro Ala Pro Thr Ala Ala Asn Gly Gly Val Gly Ser Leu Ser Val
1 5 10 15

<210> SEQ ID NO 333
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein BARF 1 fragment

<400> SEQUENCE: 333

Ala Asn Gly Gly Val Gly Ser Leu Ser Val Ala Val Asp Leu Ser
1 5 10 15

<210> SEQ ID NO 334
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV - protein BARF 1 fragment

<400> SEQUENCE: 334

Gly Ser Leu Ser Val Ala Val Asp Leu Ser Leu Pro Lys Pro Trp
1 5 10 15

<210> SEQ ID NO 335
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein BARF 1 fragment

<400> SEQUENCE: 335

Ala Val Asp Leu Ser Leu Pro Lys Pro Trp His Leu Pro Val Thr
1 5 10 15

<210> SEQ ID NO 336
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein BARF 1 fragment

<400> SEQUENCE: 336

Leu Pro Lys Pro Trp His Leu Pro Val Thr Cys Val Gly Lys Asn
1 5 10 15

<210> SEQ ID NO 337
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein BARF 1 fragment

<400> SEQUENCE: 337

His Leu Pro Val Thr Cys Val Gly Lys Asn Asp Lys Glu Glu Ala
1 5 10 15

<210> SEQ ID NO 338
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein BARF 1 fragment

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<400> SEQUENCE: 338

Cys Val Gly Lys Asn Asp Lys Glu Glu Ala His Gly Val Tyr Val
1 5 10 15

<210> SEQ ID NO 339
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein BARF 1 fragment

<400> SEQUENCE: 339

Asp Lys Glu Glu Ala His Gly Val Tyr Val Ser Gly Tyr Leu Ser
1 5 10 15

<210> SEQ ID NO 340
<211> LENGTH: 220
<212> TYPE: PRT
<213> ORGANISM: Virus Herpesviridae
<220> FEATURE:
<223> OTHER INFORMATION: EBV-protein BHRF 1

<400> SEQUENCE: 340

Met Ala Arg Phe Ile Ala Gln Leu Leu Leu Leu Ala Ser Cys Val Ala
1 5 10 15

Ala Gly Gln Ala Val Thr Ala Phe Leu Gly Glu Arg Val Thr Leu Thr
20 25 30

Ser Tyr Trp Arg Arg Val Ser Leu Gly Pro Glu Ile Glu Val Ser Trp
35 40 45

Phe Lys Leu Gly Pro Gly Glu Glu Gln Val Leu Ile Gly Arg Met His
50 55 60

His Asp Val Ile Phe Ile Glu Trp Pro Phe Arg Gly Phe Phe Asp Ile
65 70 75 80

His Arg Ser Ala Asn Thr Phe Phe Leu Val Val Thr Ala Ala Asn Ile
85 90 95

Ser His Asp Gly Asn Tyr Leu Cys Arg Met Lys Leu Gly Glu Thr Glu
100 105 110

Val Thr Lys Gln Glu His Leu Ser Val Val Lys Pro Leu Thr Leu Ser
115 120 125

Val His Ser Glu Arg Ser Gln Phe Pro Asp Phe Ser Val Leu Thr Val
130 135 140

Thr Cys Thr Val Asn Ala Phe Pro His Pro His Val Gln Trp Leu Met
145 150 155 160

Pro Glu Gly Val Glu Pro Ala Pro Thr Ala Ala Asn Gly Gly Val Met
165 170 175

Lys Glu Lys Asp Gly Ser Leu Ser Val Ala Val Asp Leu Ser Leu Pro
180 185 190

Lys Pro Trp His Leu Pro Val Thr Cys Val Gly Lys Asn Asp Lys Glu
195 200 205

Glu Ala His Gly Val Tyr Val Ser Gly Tyr Leu Ser
210 215 220

1. A method of treating a post-haematopoietic stem cell transplantation human patient in need thereof with immune reconstitution therapy by administering a therapeutically effective amount of therapeutic T cell population selected and/or expanded from a mobilised blood sample or a mobilised apheresis sample, wherein selection is on the basis of a steady state marker and/or an activation marker optionally followed by expansion, or expansion is in the presence of antigen, such as a viral antigen.

2. (canceled)

3. A method according to claim **1**, wherein the T cell population is an antigen-specific T cell population.

4. A method according to claim **3**, wherein the antigen-specific T cell population is specific a virus for example selected from the group comprising cytomegalovirus, adenovirus, varicella zoster virus, BK virus, human papillomavirus, hepatitis B virus, hepatitis C virus, Epstein-Barr virus, Kaposi's sarcoma-associated herpes virus and human T-lymphotropic virus, such as cytomegalovirus or adenovirus.

5. A therapeutic T cell population selected and/or expanded from a mobilised blood sample or mobilised apheresis or pharmaceutical composition comprising same, wherein selection is on the basis of a steady state marker and/or an activation marker optionally followed by expansion, or expansion is in the presence of antigen, such as a viral antigen.

6. (canceled)

7. A therapeutic T cell population or pharmaceutical composition comprising same according to claim **5**, wherein the T cell population is an antigen specific T-cell population.

8. A therapeutic T cell population or pharmaceutical composition comprising same according to claim **7**, wherein the antigen-specific T cell population is specific a virus for example selected from the group comprising cytomegalovirus, adenovirus, varicella zoster virus, human papillomavirus, hepatitis B virus, hepatitis C virus, BK virus, Epstein-Barr virus, Kaposi's sarcoma-associated herpes virus and human T-lymphotropic virus, such as cytomegalovirus or adenovirus.

9. A therapeutic T cell population or pharmaceutical composition according to any one of claim **5**, **7**, or **8**, wherein the population is directly selected on the basis of a steady state marker namely the T cell receptor, for example by reversible ligation of the T cell receptor by specific HLA:peptide complexes, in particular Tetra, Penta and/or Hexa streptamers.

10. A therapeutic T cell population or pharmaceutical composition according to any one of claims **5**, **7**, or **8**, wherein the activation marker is a cell surface marker that is upregulated as a consequence of antigen stimulation, for example selected from the group comprising CD25, CD69, CD137 and CD154.

11. A therapeutic T cell population or pharmaceutical composition according to any one of claims **5**, **7**, or **8**, wherein the T cell product is an expanded T cell product, in particular expanded in an antigen specific manner.

12. A therapeutic T cell population or pharmaceutical composition according to any one of claims **5**, **7**, or **8**, wherein the population is substantially negative for cells with the CD25 marker.

13. A therapeutic T cell population or pharmaceutical composition according to any one of claims **5**, **7**, or **8**, wherein the T cell population is allogeneic.

14-28. (canceled)

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